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ABSTRACT

This book is a compilation of papers presented at a seminar on cognitive development in South Africa and one additional paper. The papers were intended to stimulate research and stress the need for program evaluations. Papers concerned: (1) an initiative to improve black primary school teachers' English language, thinking, and teaching skills, and primary school students' English language and thinking skills; (2) the evaluation of a program to improve students' English language skills; (3) a model for improving the thinking skills of economically disadvantaged students and enhancing their accessibility to various academic disciplines; (4) efforts to assist black university students who are considered underprepared for university studies; (5) a study that examined the effects of ethnicity, degree of urbanization, and geographic location on children's social interaction and language usage in the year before they enter school; (6) a project to improve teachers' ability to teach thinking skills; (7) projects that apply Feuerstein's instrumental enrichment program to the needs of teachers in training and of disadvantaged students in enrichment programs; and (8) a teacher orientation and training program that emphasizes the teachers' awareness of students' active involvement in the learning process. Reference lists are provided with individual papers. (BC)

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Cognitive development in the Southern African context

Papers of the seminar on cognitive development, 1 November 1990

Compiler: Hetta van Niekerk

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PREFACE

> Then said a teacher, Speak to us of Teaching. And he said: No man can reveal to you aught but that which already lies half asleep in the dawning of your knowledge. The teacher who walks in the shadow of the temple, among his followers, gives not of his wisdom, but rather of his faith and his lovingness. If he is indeed wise he does not bid you enter the house of his wisdom, but rather leads you to the threshold of your own mind (Gibran 1966:64)[1].

On 1 November 1990 a seminar on Cognitive Development in the Southern African Context was held at the Human Sciences Research Council. With the exception of the article "Methodological issues in evaluation research: A case study", this publication is a compilation of the papers read during the seminar.

The theme of the seminar was directed by the following train of thought. Cognitive development is not regarded as a conditional process which, for some reason or other, could fail to occur. With or without intervention, cognitive development happens anyway. However, it is argued that adjustment to the technologically advanced and information-loaded society of our time could be enhanced in at least two ways. Society at large could be actively equipped for cognitive demands imposed on it, or intervention programmes could be implemented to correct inadequate cognitive functioning among particular individuals. During the seminar the main focus was on this secondary and therefore deliberate development of cognitive processes with a view to the optimal intellectual functioning of every individual in society.

Deliberate attempts to foster cognitive developme have become important. Macdonald (1990:57)[2] observes: "Formal western schooling reduces contextual learning, and if this kind of learning is not going to be mediated in the home, then the primary agency of mediation for this will be the school itself. The school will have to be the mediating agency between the known and the new realities."

With a view to addressing the interests and needs of a range of South African practitioners and researchers in education and psychology, papers were selected in three thematical categories:

* Local research studies on cognitive development
* Methodology of programme evaluation
* Cognitive enrichment programmes developed and implemented in South Africa

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[1]Gibran, K. 1966. The Prophet. Johannesburg: A.D. Donker.

[2]Macdonald, C.A. 1990. Reasoning skills and the curriculum (A final report of the Treshold Project) Report SOLING 18 1990. Pretoria: Human Sciences Research Council.

The reason for including selected papers in research methodology and applications was twofold. Not only were these papers intended to generate (further) research projects by practitioners, but also to make them aware of the need for evaluation studies with a view to economic implementation. Four papers focused specifically on the local development and/or implementation of cognitive enrichment programmes. Although cognitive enrichment programmes have been developed worldwide, these programmes' implementation locally is characterized by contextualization. Thus the implementation of a selection of programmes in the South African context was discussed.

Without exception, the presentations were of a commendable standard. The speakers have to be congratulated on their thorough preparation and attempt to present sometimes highly theoretical material in a digestible form. I hope that this publication will usefully serve as both reference source and guide to programme implementation and evaluation.

Hetta van Niekerk
PROJECT LEADER: SEMINAR ON COGNITIVE DEVELOPMENT

COGNITIVE DEVELOPMENT IN THE SOUTHERN AFRICAN CONTEXT: OPENING AND WELCOME

Ricky Mauer
Group:
Human Resources, Human
Sciences Research Council

A phrase - or has it reached the somewhat dubious status of becoming a slogan? - that has been bandied about to the extent that it is in grave danger of becoming not much more than a rather boring truism, is the claim that "our greatest resource" (or, in some cases, "our greatest asset") "is our people".

This claim is altogether too glib. Those who propound such a point of view appear to me to be somewhat out of touch with the sociopolitical and economic realities of this part of the subcontinent and, for that matter, of the world in general. Typical dictionary definitions of the meaning of the word *resource* are *means of supplying what is needed, stock that can be drawn on, available assets,* and *country's collective means for support and defence*. Surely then, from both a commonsense and an economic perspective, the accepted norm is, and should be, to do whatever is possible to add to the value of all potential resources.

In a similar vein, the term used by metallurgists in this context is "beneficiation". And the metallurgical metaphor is probably not too far-fetched. Typically, metallurgists would be interested in enhancing the quality of the raw product by processes such as washing, flotation, solvent extraction, and a variety of others. The aim is clearly to turn a raw material into something which is really a resource, into something that can genuinely contribute to the "collective means of support" of the country.

Have we, in the development of our social and educational structures, provided incontrovertible evidence that we have been trying to add to this resource? Are people really an asset when they are allowed to die of starvation? Can they be regarded as a resource when many of them are uneducated and unemployed and many, at least on the surface, appear to be ultimately unemployable? What kind of asset is embodied in mindless conflicts, wars and genocide? I find it difficult to see any form of "beneficiation" in such situations. But enough of cynicism!

Perhaps it would be more appropriate and accurate if we were to claim that people are <u>potentially</u> our greatest asset. With the natural resources and the population size that we have at our disposal we, in this subcontinent, ought to be in a position in which we can accomplish the finest dreams that humankind can dream as far as the quality of life of all people are concerned. While I am well aware that economic indices are not an adequate measure of quality of life, they can, at least, serve as a coarse indicator of the situation that has arisen. And one example will suffice to indicate that we have not really made great headway in terms of the development of the potential of the people who live here. Until the midseventies, South Africa outstripped countries like Korea and Taiwan in terms of export figures, gross national product and average per capita income. During the past 15 years, however, we have accomplished the unfortunate distinction of lagging progressively further behind these countries on the indices to which I have referred.

Given the situation that has developed here, and the obvious inability of the tried-but-not-to-be-trusted systems of the past to address the problems which we face in a meaningful manner, it would appear to me that this one-day symposium could not have been arranged at a more opportune time. To contribute to redressing the problems of the past, to supplementing existing approaches, to ensuring that we will indeed be able to take advantage of the great potential that is locked into the people of this region, and steadily to increase the quality of life of all those who inhabit this subcontinent, the advances that have been made in the field of cognitive development offer a great deal of promise. The problems that face us are of such a magnitude that with the knowledge that we have at our disposal it would, at the very least, be ethically unjustifiable to allow a situation to develop where we do not turn the promise of the various approaches to cognitive development into a reality.

From the content of the programme and the summaries that today's presenters have submitted, I gain the impression that we have a rich fare on offer. Not only will we hear accomplished theoreticians, but we will also be able to benefit from the practical experience of the speakers. The empirical material that is to be presented will demonstrate that the approaches advocated by cognitive development experts have considerable utility; they can be harnessed to enhance the cognitive skills which already exist, potential too long dormant can be unfettered and new horizons can be opened for individuals who have, for reasons well known, been deprived of the opportunities and skills which would have enabled them to have added substantially to their own quality of life and to that of others.

The speakers that you will hear today are well known for their expertise and their dedication to the area in question. I would like to welcome them here, and to thank them in advance for being prepared to share the wealth of their knowledge, experience, and wisdom with us. I am sure that you will agree with me that a special welcome should be paid to Mrs Beatriz Capdevielle who is visiting here from Venezuela and to Dr David Perkins from Harvard University. It would be churlish not to extend to you, the delegates, who are drawn from a variety of disciplines, but who share a common interest and belief in the development of the potential of people, a hearty welcome. Without delegates, no conference or symposium can possibly take place.

May I also, ladies and gentlemen, express the sincere hope that all of you will leave this symposium with new insights and even more enthusiasm for the major responsibility that we all have to make available to the country and to its people the skills and cognitive strategies that will ensure that human dignity, the development and use of potential, and, in the final analysis, equity and a reasonable quality of life are attained.

THE LANGUAGE OF CHANGE AND THE DEVELOPMENT OF COGNITIVE SKILLS. REPORT ON UPTTRAIL'S ENGLISH AND OPERACY

Dawid van der Vyver, UPTTRAIL Trust
Beatriz Capdevielle, Project Intelligence, Venezuela
David Perkins, College of Education, Harvard University

ABSTRACT

A major initiative for the teaching of English and thinking skills was launched in KwaZulu by the UPTTRAIL Trust.

In this article, the needs and circumstances that prompted this initiative are briefly referred to. Attention is focused on how conceptualization of this initiative took place and how it was started. A more detailed discussion follows of the rationale behind developing the packages for the in-service training of the teachers (aimed at improving their English language, their thinking and their teaching skills) as well as for developing the English language and thinking skills of Standard 3 pupils, and of the results and the evaluation of the pilot project. The article is concluded by placing the UPTTRAIL initiative in a larger context and by arriving at conclusions with regard to the significance of what took place and of what is about to happen.

UPTTRAIL INITIATIVE

A major initiative, aimed at improving significantly the quality of teaching and learning in primary schools for blacks, was launched by the UPTTRAIL Trust in 1989. The outcome of this experiment, probably the most extensive one of its kind in Southern Africa, was encouraging and deserves the serious attention of educators and sponsors.

THE NEEDS AND CIRCUMSTANCES THAT PROMPTED THE INITIATIVE

Since 1979 the problems around the issue of English as a medium of instruction in black primary schools were at the top of the priority list of an Interuniversity Committee for Language Teaching. This Committee was deeply concerned about the general picture, which, in spite of a number of commendable project or interventions, looked, generally speaking, rather bleak. (Today, 12 years later, indications are that the situation is even more critical and desperate than before.)

The burning question was how something could be done that could effect a noticeable general improvement in the quality of teaching and learning at primary school level. It was decided that two major tasks should be undertaken:

- to conduct a thorough analysis into the English language needs and deficiencies of black primary school teachers in a limited, but fairly representative, geographical area in South Africa, and

- to search for innovative approaches with which the quality of teaching could be enhanced and the tempo of learning be accelerated. (For a description of the needs to be addressed in an innovative way, vide Thembela 1989.)

Funded by the HSRC (Human Sciences Research Council), the needs analysis was done with a statistically representative number of primary school teachers in KwaZulu, in close co-operation with planners, inspectors, principals and teachers of the Department of Education and Culture. The report, which contained guidelines for a more relevant syllabus for training and in-service training of primary school teachers, was released for publication by the President of the HSRC and appeared in 1985 as Special Issue Nr 1 of the journal Per Linguam. A second report followed which determined and analyzed the relevant constraints prevalent in colleges where training and in-service training of primary school teachers takes place (Odendaal *et al.* 1986).

The history of the search for, experiments with, and publications in national and international journals about innovative / accelerative approaches is presented in detail in an HSRC report of 1989 by van der Vyver and Botha. In this report, in which the terms Suggestopedia / SALT and Suggestopedic / SALT are explained and qualified, attention is focused inter alia on

- a controlled experiment at the Cape Town College of Education with a remedial course of 43 hours as a result of which the failure rate in Afrikaans as a second language for first year students came down from 7,4 % (the average for the previous 5 years) to 1,1 %, and, as a result of which there was a highly significant improvement in the students' proficiency in their second language, in comparison with students in control groups (Botha 1985);

- a controlled experiment in two teacher training colleges with a remedial course of 33 hours, as a result of which there was a statistically highly significant improvement in the verbal IQ counts of the students in the experimental group, in comparison with students in the control group (Odendaal 1990).

Researchers and teachers increasingly began to think that Suggestopedia / SALT or enriched Suggestopedia could contribute significantly towards improving conditions in education for blacks and ultimately in education for all South Africans.

After discussions (during an international conference in 1986) with representatives of Project Intelligence (Venezuela) and after a study of a specific report of Project Intelligence (Harvard University *et al.* 1983), the idea emerged to integrate language teaching with the teaching of thinking strategies in a way that

could further enchance language acquisition / intelligent communication and that would also enhance metacognition. This could be done in addition to the teaching of the notions and functions (specifically macrofunctions) identified during the needs analysis referred to above. This integrated teaching of English and thinking skills could be accomplished by utilizing Suggestopedia / SALT or enriched Suggestopedia (enriched with other innovative approaches to language teaching [Blair 1982], enriched by the work known as Neurolinguistic Programming [vide Dilts *et al.* 1980] and enriched by the insights gained from the theory of Watzlawick [1978] with regard to the power and the effect of metaphoric language).

It was hoped that this new and unique amalgam of innovative language teaching methods and methods to promote thinking skills would prepare teachers and pupils for better and more effective participation, not only in all the subjects of primary education, but, indeed, in all the processes of society. If the language and thinking proficiency as well as defective teaching methods could be significantly improved, the entire range of problems in education for blacks, and not merely aspects of it, could be influenced positively.

It was after years of research and experiments and after this conference that the Interuniversity Committee for Language Teaching decided to launch a major pilot project with which hopefully it could be convincingly demonstrated that a significant overall improvement in the quality of teaching and learning at primary level could be effected.

In February 1987 a proposal was submitted to a group of business leaders and senior educationists (vide van der Vyver & Botha 1989; Van der Vyver & Capdevielle 1989), after which, under the chairmanship of Prof Alex Thembela, Vice-Rector, University of Zululand and former member of the Interuniversity Committee, the UPTTRAIL (Upgrading of Teaching, Training and Learning) Trust was established. This Trust, led by prominent businessmen and educationists, would launch, fund and monitor the pilot project and would have it evaluated by an independent panel of evaluators. After successful completion of the pilot project, it would obviously also be concerned about possible adaptations and wider implementation.

The first task of the Trust was to plan a research design for an experiment and results that would warrant valid conclusions in view of wider application. The Trust wanted to be able to say after the completion of the pilot project: "If it was possible to achieve these results with these teachers and pupils in these schools, then it should be possible to do the same in all the schools." (For historical, practical and strategic reasons it was decided to conduct the experiment in KwaZulu.)

This research design was subsequently planned in co-operation with senior representatives of the Institute for Language Teaching, University of Stellenbosch and senior staff members of the HSRC (including the head of research methodology and two vice-presidents). It is described in detail in Part 2 of a comprehensive report prepared for the UPTTRAIL Trust (Mouton *et al.* 1990). The objective of this article is rather to focus attention on the outcome of the pilot project, as well as on the significance thereof.

COURSE DEVELOPMENT AND TRAINING

Following a request of the UPTTRAIL Trust, the Institute for Language Teaching, University of Stellenbosch (INTUS) started in January 1988 with the development of the materials and selection of didactic strategies for the in-service training. Based on the needs analysis referred to on a previous page, the course utilizing enriched Suggestopedia as a didactic model, would aim at the improvement of English language proficiency, thinking skills and teaching skills. It would, in addition, prepare the teachers for the utilization of a package for the integrated teaching of English and thinking skills in the classroom. The Institute was also responsible for developing this package, aimed at communicative language teaching and based on the functional-notional approach to syllabus design, based on study of the syllabus for Standard 3 pupils in KwaZulu and based on the requirements of the syllabuses for the other Standard 3 subjects. Furthermore, it was based on the needs analysis referred to above and on the advice received from Capdevielle (Project Intelligence), de Bono (vide de Bono 1985, 1986) and other consultants on cognitive development. It was also decided to utilize enriched Suggestopedia for this course.

MOTIVES FOR THE TEACHING OF THINKING SKILLS

The motivation for the teaching of thinking skills was considered against the background of the characteristics of today's world. One of the most striking features that characterizes today's world is change: a continuous and rapid change in numerous aspects of human life. This change requires anticipation, assimilation and a capacity for constant adaptation. The processes of anticipation, assimilation and adaptation presuppose the ability to apply general and specific thinking skills. These skills are rarely acquired adequately without deliberate teaching, learning and practising.

Another outstanding characteristic of today's world is the increase in the freedom of choice. Two of the obvious consequences of this increase in the freedom to choose are the need for improving the abilities to perceive the various options for choice and for improving the ability to evaluate them adequately.

Moreover, the information explosion and the concomitant development and expansion of the communications' technology lead to an exposure of rapidly increasing amounts of new information, to new arguments and to constant efforts to persuade and convince the reader or listener of different beliefs and opinions. Thus, the need to be capable to assimilate new information, to assess it and, even more important, to evaluate the (frequently conflicting) evidence that is put forward, become imperative; as does the ability to construct arguments and counter-arguments.

The problems of today are also very different from those experienced by previous generations. They are different not only in terms of the type of problems, but also in terms of their complexity. Therefore, today's generation is almost obliged to have some specific preparation to be able to face and solve these problems successfully.

To all that has already been mentioned can be added to results of numerous scientific investigations that show that, in everyday life, people frequently do not make wise choices, that they are often easily persuaded (or manipulated) and, in general terms, do not know how to handle new problems or how to take wise decisions in normal everyday situations.

All of this directly relates to what in Cognitive Psychology has been called "default patterns of thinking". Default patterns are habits of thinking which originated and developed, quite naturally, during the socialization process, due to various causes, including the human reliance on quick pattern recognition, the tendency to stereotype, limited short-term memory capacity, and mechanisms of ego defence. Default patterns can be easily detected in, and are characterized by, hastiness or impulsiveness, narrowness, dispersedness and the lack of clarity or precision in the thinking process.

The need to teach how to think becomes crucial for the improvement of the so-called learning skills (Sternberg 1981), such as reading skills, which are directly related to the ability to comprehend (Whimbey 1975). It is, of course, also crucial for study and memory skills which are both indispensable in the learning process. It has been shown by multiple researchers that content is better understood and retained when it has been learned in a thoughtful way (Nickerson, Perkins & Smith 1984). Some of the mental tools in the UPTTRAIL packages (vide Odendaal & Botha 1990 for a list and description of the tools) have been specifically selected in view of these tasks.

The mental processes are of vital importance in teaching and learning. On the one hand, they act as organizers of the content, and thus facilitate the learning (Brown & Campione 1978); on the other hand, they permit the interrogation of one's own knowledge and, even more, create additional knowledge because, through them, one learns to probe the unknown. In the same way, the use of mental tools promotes the active participation of pupils, an extremely important feature particularly in educational

systems where the use of traditional teaching techniques leads to a passive attitude and behaviour by both teachers and pupils. They also facilitate and foster inquiry and discovery of new information as well as the validation and evaluation of that information.

EXPERIENCE IN GENERAL WITH THE TEACHING OF THINKING SKILLS

Looking at the general experience with the teaching of thinking skills, it has to be pointed out that up until relatively recently, this experience has been characterised by unsuccessful attempts. Only lately, and as a result of the contribution of certain scientific fields, has the nature of this experience changed complete and has it achieved more and more successful results (Nickerson, Perkins & Smith 1984).

Two very important discoveries have greatly influenced the area of cognitive development. One of them involves considerable more knowledge about what has been called "misconceptions" in the learning process (especially in subjects such as Mathematics and Natural Science) that interfere with the understanding of new concepts (Clement 1982; McCloskey 1983; Perkins & Simmons 1988). Misconceptions are especially difficult to recognize and identify, and have thus been overlooked for a long time. Students with misconceptions are able to yield quite acceptable results at school, particularly when these results are the outcome of traditional tests and examinations, basically because they learn to utilize algorithms and formulas to solve problems, without understanding their underlying processes. Another important discovery in the field of Psychology has to do with metacognition, with the possibility of controlling the thinking process and with the ability to improve it. Various research results show that the process of metacognition takes place very early in life, hand in hand with the acquisition of language (Flavell 1978). This process is crucial in areas such as decision-making and problem-solving. Some options and directions are not consciously perceived and become possible only through self-monitoring the achievement of successful behaviour.

Another important contribution has been made in the field of Philosophy. Authors such as Kohlberg (1971) and Lipman (1976) have been in the forefront in the development of critical thinking, in the examination of beliefs and in understanding the significance of reasoning skills in the development of moral judgement.

These and other contributions (such as in Sociology and Anthropology), have greatly influenced the field of education. There are multiple examples of experiments and research that have been carried out in schools and, specifically, in the classroom (for an extensive report on various programmes, see Nickerson, Perkins & Smith 1984). The programmes for the Development of Human Intelligence in Venezuela are surely some of the most extensive which have made a significant social impact.

One of the major changes that have taken place in the teaching of thinking skills has to do with the way in which these skills are taught and learned. Until quite recently and with a few exceptions, the teaching of thinking skills was done in an atomistic manner; in other words, the mental instruments or tools were first taught individually. Later, they were applied to previous selected cases, were extensively practised and it was hoped that by then the pupils would be capable of transferring their application to the various school and daily life situations.

Today, however, there is a general tendency, supported by scientific results, to teach thinking skills in a much more holistic way. The teaching takes into account not only the knowledge and domain of the different mental processes, but also other influential aspects, such as the type of situations in which the processes are applied, the previous experience, purpose and attitude of the thinker and the influence of these factors on what he/she perceives. Transference of the thinking tools is not taken for granted but is deliberately and systematically taught and the processes are integrated not only with other subject matters but also with other aspects of life.

In summary then it can be said that the teaching and development of cognitive skills have been strengthened by the contribution of different fields of knowledge such as Psychology, Philosophy, Sociology and Anthropology. The experience derived from its application in educational and even in business settings has been equally significant in the transformations that the teaching and learning of thinking skills have undergone.

RATIONALE BEHIND THE SELECTION OF THE SPECIFIC TOOLS IN THE UPTTRAIL PROGRAMME

Two main considerations determined the selection of the specific thinking components taught in the UPTTRAIL programme. The first one has to do with the characteristics of the target population. The second one deals with the suitability of specific thinking components in view of achieving the programme's goals.

The characteristics of the target population have been researched and described by authors such as Odendaal (1985) and Thembela (1989). A few of the most relevant aspects that have affected the present educational system may be listed here: the excessively high number of students per classroom, the poor preparation of the teachers, the economic restraints and limited physical conditions of the schools in general and of the classrooms in particular, the low levels of motivation, both of the teachers and of the students, the poor knowledge of the language (English) used as a medium for teaching and learning, the general use of traditional teaching techniques, and, in general, a passive and maybe even impotent attitude on behalf of the main actors (students and teachers) of the educational system.

Considering the characteristics of the target population, the thinking skills components to be selected for the programme had to meet certain requirements in order to achieve the desired objectives. To mention just a few of the most important features: the specific tools chosen were those that are quite easy to teach and are highly motivating for both the student and the teacher; those that foster participation of large groups; tools that are able to adapt to any subject and can be applied and practised in any situation; tools that do not require additional educational materials and that can be easily integrated with other language teaching components; and, finally, tools that enhance understanding and promote abstract thinking.

The training courses for the experimental and control teachers took place in January 1989. Staff members of the Institute, assisted by Capdevielle, were responsible for the 11,5 day course with the experimental teachers. The KwaZulu Department of Education and Culture handled the course for the control teachers, utilizing a different method for communicative language teaching. (For a detailed description of how the packages were prepared and how the training was handled, vide Odendaal & Botha 1990.)

MEASUREMENT AND DATA-COLLECTION (essentially from the executive summary in Mouton *et al.* 1990)

Outcome measures used in the study comprised the following:

TEACHERS

- A battery of standardized tests
- A biographical questionnaire developed for the study
- A self-concept scale adapted for the study

PUPILS

- A battery of standardized tests
- End of the year examination marks in three subjects
- A pupil's questionnaire developed for the study
- A self-concept scale developed for the study

The data-collection process was fully supervised by HSRC staff. School psychologists were trained by members of the HSRC's Institute for Psychological and Edumetric Research and were also monitored throughout the year by HSRC staff. The post-coding and checking of the collected data were again

supervised by experienced HSRC staff members. The data were captured and processed by staff of the HSRC Computer Centre.

The analysis established that, with the exception of the pupil's self-concept scale, all the measures can be regarded as reliable and to a large degree also as valid. There is evidence that some of the instruments were not in all cases sufficiently finely tuned to register more qualitative changes which occurred during the programme. This implies that, as confirmed by the meta-evaluation, the instruments probably underestimated the amount of learning that actually took place!

FIELD STUDY

Given the constraints prevalent in schools in KwaZulu, such as large classes, poor infrastructure, underqualified teachers, etc. it was deemed essential that the monitoring component would comprise in situ observations of all (experimental and control) classes. These observations were carried out during four week-long visits to the schools by the monitoring team.

To enable the team to carry out its brief, the members attended part of the training to acquaint themselves with the overall objectives and specifically with the demands that proper implementation of the programme would make on the teachers.

The main objective of the classroom sessions (experimental group) was to establish the extent to which the key elements of the programme were present. Teachers in both the experimental and control groups were scored on the following categories derived from a structured observation schedule:

- Utilization of pupil skills and abilities
- Learning opportunities offered by material
- Pupil motivation
- Flexibility of material and procedures
- Teacher / pupil roles
- Pragmatic considerations.

Scores thus obtained were used to rank the teachers. This ranking formed the basis of a classification into two groups: in the case of the experimental group between those implementing the programme properly and those who did not; in the case of the control group between those deemed to be good teachers and the other.

STATISTICAL ANALYSIS

Data collected on the various implementation and outcome measures were eventually merged into one data set. The staff of the HSRC's Institute for Statistical Research were consulted throughout the analysis stage.

KEY FINDINGS

TEACHERS

The first question was whether a significant increase had occurred in the Academic Aptitude Test (AAT) scores of the teachers in the experimental group compared to that of the control group. Two components had to be distinguished here:

- Whether an increase from the pretest to the posttest had occurred: this would indicate that the training had an immediate effect.

- Whether there was an overall improvement from the pretest to the follow-up test at the end of the year. Were this to be the case, one would have grounds for believing that the programme's effect, if any, is to some extent durable.

The first model which was fitted, tested whether the UPTTRAIL programme had an immediate effect on the cognitive and language-related skills of the teachers: it was hypothesized and differences in the post test scores could best be explained by the differences in the initial pretest scores and the differences between the experimental and control group.

The second model which was fitted, tested whether the UPTTRAIL programme also had a long-term effect on the cognitive and language-related skills of the teachers. Again it was hypothesized that differences in the follow-up tests scores of the total group could best be explained by the differences in the initial pretest scores and the differences between the experimental and control group.

The results of these analyses revealed the following:

- The in-service training course clearly led to an improvement in the non-verbal reasoning skills of the experimental teachers compared to the control teachers. In terms of the model, the predicted short-term improvement would amount to 18 % and the long-term improvement to 17 %.

* The only other (somewhat marginal) result would suggest that the course led to some short-term improvement in the verbal reasoning skills (11 %) of the experimental teachers. This effect, however, disappears over the long term.

The course did not have a significant effect on the vocabulary or the comprehension skills of the teachers.

To summarize:

As the results show, the only statistically significant differences which were found between the experimental and control groups from the pretest to the follow-up test were in the area of reasoning (especially non-verbal) skills. This suggests that the training programme had some short-term and long-term effect on the more clearly cognitive skills of the teachers. However, there is no evidence that the training course had a short-term or long-term effect on the more language-based skills such as comprehension and vocabulary. This, of course, does not in itself imply that the training programme could not lead to an improvement of the language and thinking skills of the pupils, as they would be exposed to a comprehensive set of course materials.

An analysis of covariance was done to test whether significant changes occurred in the self-concept rating between the pretest and posttest on the one hand, and between the pretest and the follow-up test. None of the differences between the experimental and control groups were found to be significant. This suggests that the training course did not have an effect on the self-concept of the teachers. However, one should allow for the possibility that the instrument was not valid. The experience of the monitoring team was that the teachers in the experimental classes showed more confidence and were more relaxed and enthusiastic compared to their counterparts in the control group. Whether these aspects are indicative of a higher self-concept and whether self-concept is a construct, which can be changed through a three-week training course, is a different matter.

The most important conclusion of the monitoring study was that undergoing training in the didactic method does not necessarily result in the ability to implement it. There are certain abilities and dispositions that seem to be as necessary as the relevant training. By the very nature of the method, which requires spontaneous and authentic communication, a reasonable control of English and a basic teaching talent are indispensable. During the monitoring process it was found that only a third of the teachers met these requirements and were therefore able to implement the training programme properly.

PUPILS

In terms of the stated objectives of the UPTTRAIL intervention, two areas were of particular interest: the cognitive and the English language skills of the pupils. The results are discussed in terms of these two main areas.

English language skills

The main hypothesis of the study was that the in-service course and the utilization of the new package for the integrated teaching of English and thinking skills would lead to a substantial improvement in the English language skills of the pupils. One can safely state that the research which has been done in this project unequivocally validates this hypothesis. Through a series of analyses it has been shown that pupils in the experimental classes (irrespective of the model fitted) did in fact do significantly better both in the examination English and the standardized English tests. This fact has been substantiated in a variety of ways:

- Through exploratory XAID-analyses
- Through a series of analysis of covariances
- In terms of expected pass rate.

A very important validation of the effectiveness of the intervention with regard to language skills is to be found in the fact that the improvement in English has clearly been transferred to a subject such as Social Studies. The extent of the differences between experimental and control group pupils under the various models is also always quite large (ranging between 12 and 21 %). This compares well with the observed difference between the experimental and control groups of 17 %.

In general, then, the programme has been found to lead to a substantial improvement in the English language skills of the pupils. In terms of the experience of the monitoring team in the classrooms this must be ascribed to both the innovative teaching methods used by the teachers, as well as the course material.

Cognitive skills

The result of the UPTTRAIL programme at the level of Mathematics and other non-verbal reasoning skills are less straightforward. The research shows that the pupils in the experimental groups (all three models) would not be expected to do better in examination Mathematics than their counterparts in the control classes. Similar findings were obtained for the standardized Mathematics tests where no significant differences between experimental and control classes were found.

different subject matters, and so on. Students often have subject-matter misconceptions at this "higher" level too, misconceptions that impact powerfully on their attitudes towards and abilities with the subject matter. Moreover, conventional instruction hardly addresses these higher levels of subject-matter knowledge. Accordingly, to do just that becomes an important mission of the metacurriculum (Perkins & Simmons 1988).

2. Language of thinking

Olson and his colleagues (Olson & Astington 1990 in press) at the Ontario Institute for Studies in Education have reported some interesting work about the occurrence of what they call "mental state terms" in textbooks - terms such as "conjecture", "hypothesis", "evidence" and so on. Such terms, they note, have been almost squeezed out of textbooks over the last twenty years, appearing with less and less frequency because, apparently, they are perceived as "too difficult" for today's pupils. Olson bewails this trend because, after all, such terms represent not any exotic "thinking skill" but the common heritage of the English language for talking about ideas.

Besides this natural heritage that Olson refers to, contemporary work on thinking skills has drawn attention to other less commonplace but still powerful ways of organizing thinking - "languages," one might call them, for thinking about and organizing thinking better. Verbally mediated stepwise strategies are one sort of language - as for example in many strategic reading strategies or de Bono's "operations" (vide Nickerson, Perkins & Smith 1985, for a survey). Graphic organizers for thinking about what one has read or graphic techniques such as concept mapping provide another, more visual language of thinking (e.g. Jones, Pierce & Hunter 1988 - 1989; Novak & Gowin 1984). In general, the point is that languages of thinking of diverse sorts are an important and empowering component of the metacurriculum.

3. Integrative mental models

The subject matters as typically taught present learners with a vast grab-bag of pieces of knowledge, with little toward an overarching conception of how they fit together that would help to anchor the pieces in place and give meaning to the whole. Yet there are signs that this challenge can be met. It is possible to introduce an "integrative mental model" - visual images or verbal categories that capture in broad stroke whole subject matters or large parts of them and help learners to organize the learning process better.

For example, in research and development work done on the pedagogy of computer programming, Perkins and his colleagues evolved an overarching metaphor called "the data factory". All commands and other features of programmes were framed as elements in the "data factory," and the action of a programme was viewed as carried out by a labourer in this data factory. Pupils found this a very clarifying metaphor. A supplementary instructional unit built upon this and some other points yielded substantial increases in pupils' understanding and writing of programs (Schwartz, Perkins, Estey, Kruidenier & Simmons 1989). In general, as in this case, the metacurriculum calls for a search for overarching mental models to provide integrative frameworks for subject-matter learning.

4. Learning to learn

Developmental studies have disclosed something quite remarkable about youngsters: As soon as they are old enough to utter complete sentences, they already have ideas about the mind, memory and learning. They are already "metacognitive" to some degree. Research also disclosed that, in the normal course of growing up, students develop vastly different degrees of sophistication about the learning process. Some evolve complex sophisticated repertoires of learning strategies, whereas others emphasize rote learning and dogged repetition (e.g. Pressley & Brainerd 1985).

There is ample evidence that youngsters can "learn to learn". For example, research on strategic reading shows that some simple reading strategies considerably boost understanding and retention of information in texts (Haller, Child & Walberg 1988). Yet the "learning to learn" that occurs in the normal course of events is spotty and haphazard. Accordingly, "learning to learn" needs to be one of the primary concerns in building a metacurriculum for contemporary education.

5. Teaching for transfer

Education inevitably aspires to the "transfer of learning" - students applying in fresh contexts such as different subject matters or life outside of school what they have learnt in a particular subject-matter context. Unfortunately, considerable research shows that this aspiration is problematic. Transfer across subject matters or into different areas of life commonly does not occur spontaneously. Pupils do not carry over the Mathematics skills they have learned to Physics, do not look at current events through the lens of their historical knowledge, and so on. Some psychologists have gone so far as to conclude that the prospects for rich transfer across subject matters and settings are slim: Knowledge is inherently rather context bound.

However, the quality of teaching and implementation did make a difference in examination Mathematics. Under the general model, 15 % more pupils who receive proper implementation would be expected to pass Mathematics than those who receive poor quality teaching. This is in line with the results of the field study, where the monitoring team saw that the proper implementation of the programme, and especially of the thinking tools, made a real difference.

It seems as if at least two factors might account for the fact that the programme did not have any noticeable effect on the pupils' performance in Mathematics: the quality of the teaching and the very low average scores attained in Mathematics (the average 41 % in the end of year examination is a mere 8 % above the pass level).

These findings are similar to those found with regard to the results of the scores on the two non-verbal tests (Pattern Completion and Number Series). Here again, no significant differences were found between the experimental and control pupils.

One must add that these various measures (examination Mathematics, standardized Mathematics test, Number Series test and Pattern Completion test) do not in fact present adequate and appropriate tests for the cognitive skills which were taught to the pupils in the programme. These skills are predominantly problem-solving skills which would not necessarily be measured by any of these measures. This is something which would have to be addressed in any future research (Mouton *et al.* 1990).

SUMMARY

The research team of the HSRC (Mouton *et al.* 1990) believe that both the experiment and the field study attest to the efficacy of the UPPTTRAIL programme:

> Based upon the data which were collected in this study, which we believe to be the most comprehensive of its kind ever conducted in this area in South Africa, we are convinced that the correct implementation of the English Operacy programme (sic), will in fact lead to a substantial improvement in the English language skills of pupils. Given the results on the Social Studies examination, as well as the observations in the classrooms, the research team also believes that the proper implementation of the programme will improve the cognitive skills of pupils. This, however, is an area which requires further investigation.

A PERSPECTIVE ON HIGHER-ORDER COGNITION

The aim of this section is to place the UPPTRAIL endeavour in a larger context, looking specifically at current events in the development of our understanding of thinking skills and their relationship to other aspects of higher-order cognition.

When in the middle of this millenium explorers sailed West from Europe and touched at various points on what came to be known as the Americas, they had no realization of the vastness of the continents that they had discovered. Only gradually was the scale of the land mass disclosed. Something like that may be happening today in a very different realm - the topography of the mind, where psychologists and educators have been probing what might be called "higher order thinking." Although at first "higher order thinking" seemed to include only thinking skills, metacognition, and one or two other points, the more the territory is explored and mapped, the more seems to be there.

There is much advocacy for attention to the teaching of thinking these days. This is an important direction for the investment of educational resources. At the same time, the real enterprise may be much larger. It seems as though there is considerably more higher-order knowledge worthy of attention than that ordinarily encompassed by the term "thinking skills". Indeed, to do it justice, we may need not just instruction in thinking skills but a whole "metacurriculum," one might call it - a systematic organized effort to inform students about and engage them in the higher-order aspects of cognition.

This "metacurriculum" is not conceived as an add-on, a new subject matter to find a place for in an already crowded academic schedule. Rather, it might be seen as something that infiltrates all instruction. In any case, the convey how the "continent of higher order knowledge" is opening up and showing its vastness, there follows a brief effort to outline five facets of a metacurriculum, all of them important to the learner.

FIVE FACETS OF THE METACURRICULUM

1. Levels of knowledge

Many pupils of Mathematics harbour the following belief about mathematical problems: "If you can't solve it in five minutes, you can't solve it at all." This is not only a disempowering belief, but it also illustrates how pupils have views of subject matter knowledge much more general than the conventional "content" of the subject matter. Notice that this particular precept concerns no particular number fact or algebra relationship but rather the whole enterprise of mathematical problem-solving.

The contemporary literature on subject-matter learning in Mathematics and the sciences emphasizes that pupils commonly suffer from a number of misconceptions about the content. The point can be added that there is more to a subject matter than its conventional content; there is a superstructure of general attitudes, philosophies, and so on: how to solve problems, the contrasting nature of evidence in the different subject matters, how inquiry proceeds in the

However, other research paints a more hopeful picture: powerful transfer can occur, but only if the instructional process paves the way for it (Perkins & Salomon 1988; Salomon & Perkins 1989). Most instruction simply teaches the content without establishing conditions conducive to transfer. However, if the teacher introduces possible connections, encourages learners to make connections, anticipates possible applications remote from the present context, affords enough practice for the ideas to become comfortable and somewhat internalized, and encourages metacognition, much more transfer occurs. Evidently, transfer is an important part of the metacurriculum, knitting together subject-matter knowledge and non-school applications as it does. The moral of the tale is that transfer can be secured - but only with a deliberate effort to teach for it.

THE UPTTRAIL PROGRAMME IN RELATION TO THE METACURRICULUM

These facets with regard to the possible "metacurriculum" are both discouraging and encouraging - discouraging because they say that there is considerably more to attend to in the way of higher-order cognition than we might have thought, more, in short, to worry about. But encouraging because in this greater compass lies more opportunity to teach the subject matters in deep ways and to empower students as thinkers and learners.

In any case, it is useful, may be essential, to view the UPTTRAIL initiative in the broader context of the possible metacurriculum. Most straightforwardly, the initiative relates to the "language of thinking" category, seeking to impart tools that can help learners to organize their thinking better. At the same time, there is some element of "learning to learn", since certain of these thinking tools, and also strategies in the didactic model (enriched Suggestopedia) can be employed as learning tools as well, an aspect that the UPTTRAIL programme plans to emphasize more, in a more systematic way. In addition, a specific concern of the UPPTRAIL programme is teaching for transfer, so that learners carry over what they have learnt to other settings.

Another feature worth noting is that the UPPTRAIL programme, as with the whole conception of the metacurriculum, does not stand apart from the learning of the subject matter. While there may be some targeted instruction in thinking skills, there is also an emphatic commitment to integrating the teaching of thinking with subject-matter learning, in the present version of the UPPTRAIL programme with the learning of English as a second language. Extensions of the programme (vide next section) will involve integration with other subject matters as well, particularly Mathematics. Already it can be maintained that the UPTTRAIL programme, while hardly constituting anything as expansive as a metacurriculum, sits comfortably within the general spirit and substance of a metacurriculum.

SUMMARY AND CONCLUSIONS

Looking back at the objectives of the Interuniversity Committee for Language Teaching and those of the UPTTRAIL Trust, objectives with regard to the pilot project in KwaZulu, it can be said that these have largely been achieved.

Krahnke (Mouton *et al.* 1990: Appendix 10/1), one of two meta-evaluators inter alia has this to say about the work done by the team of researchers and evaluators:

> This report is complete and thorough. It described the research in detail and does so fairly and honestly. The research reported on was also thorough and well-designed ... The complex design of the research included factors frequently overlooked in studies of this type, factors such as location and class size. In short, all the important variables affecting the success of a project such as the EOP were accounted for ...
>
> The research clearly indicated that the EOP (English and Operacy Programme - the authors) was effective in increasing the learning of the pupils in the sample and that it was the EOP programme and not some extraneous factor ...
>
> There seems to be strong evidence for considering wider application of the instructional principles described in the report.

Lipsey (Mouton *et al.* 1990: Appendix 9/1), the second meta-evaluator arrives at the following conclusions:

> Overall I find this work to be a very solid piece of evaluation research. It dealt with a well-defined teaching model for which effects are plausible. The degree of implementation of the model was checked and the results incorporated into the analysis. The research design employed a control group and random assignment to conditions. A range of outcome variables was measured, a rationale was supplied for each, measurement was made at two points in time subsequent to onset of treatment, and pre-treatment measures were taken. The statistical analysis made use of appropriate covariates and blocking variables to control irrelevant variance and a report of the magnitude of the statistical effects was made in meaningful practical terms (percent passing). The conclusions and interpretations were restrained and in keeping with the evidence presented.

These characteristics distinguish evaluation research of a very high quality and the authors are to be commended for attaining such a high standard under difficult practical conditions. The results warrant confidence and should be taken seriously in any decisions to be made regarding the continuation, expansion, or modification of the English and Operacy programme.

It is now possible to maintain that UPTTRAIL can effect a significant improvement countrywide in primary education, to maintain that significantly larger numbers of disadvantaged pupils can pass Standard 3, better equipped for their future. And this can be maintained on the strength of solid research results. Although UPTTRAIL cannot state that it is the only non-government organization working for the improvement of teaching and learning at Standard 3 level, it is believed to be the only one that is capable of showing evidence of this quality with regard to improvement across the curriculum.

It follows that if the UPTTRAIL programme can be refined, expanded and strengthened, the results will even be better and the impact and benefits for the teachers and pupils even be greater. With financial assistance recently obtained from the Independent Development Trust and sources in the private sector, this refinement has already been started.

The UPTTRAIL Trust is now in the process of expanding and refining the existing packages, as well as adapting and refining the implementation strategies, against the background of the KwaZulu experience, recommendations by the teachers in the experimental group, recommendations by the teams of the Institute for Language Teaching, the HSRC, the meta-evaluators and by colleagues in the area of cognitive development. Expansion and refinement of the existing packages, as well as developing additional packages for the explicit teaching of thinking skills and of Mathematics, will seriously focus on developing the "metacurriculum" which was highlighted in the previous section of this article. There are indeed encouraging signs that, given the envisaged improvements and intensifications, the effect of the UPTTRAIL programmes across the curriculum could even be greater than in the pilot project in KwaZulu.

UPTTRAIL will also aim at determining which of the various didactic and psychological components in the packages, or which combination of them, are effective, or maybe even ineffective, and therefore where improvements can be made.

The KwaZulu experiment was not inexpensive. It was also not easy to implement and conclude. But the way in which it was done and evaluated provided the UPTTRAIL Trust with scientifically thoroughly tested results that supply a strong case / base for conclusions with regard to possible widespread and overall improvements in the quality of teaching and learning in schools for black pupils. Obtaining this kind of solid evidence was the primary objective of the Trust.

REFERENCES

BLAIR, W. (ed.) 1982. Innovative approaches to language teaching. Massachusetts: Newbury House Publishers, Inc.

BROWN, A.L. & CAMPIONE, J.C. 1978. Permissible inferences from the outcome of training studies in cognitive developmental research. Quarterly Newsletter of the Institute for Comparative Human Development, 2: 46-53.

CLEMENT, J. 1982. Students' preconceptions in introductory mechanics. American Journal of Physics, 50: 66-71.

DE BONO, E. 1986. CoRT thinking. New York: Pergamon Press.

DE BONO, E. 1985. Six thinking hats. Boston: Little, Brown and Co.

DILTS, R., GRINDER, J., BANDLER, R. & DE LOZIER, J. 1980. Neuro-Linguistic Programming. California: Meta Publications.

FLAVELL, J.H. 1978. Cognitive monitoring. Paper presented at Conference on Children's Oral Communication Skills. University of Wisconsin.

HALLER, E.P., CHILD, D.A. & WALBERG, H.J. 1988. Can comprehension be taught? A quantitative synthesis of "metacognitive" studies. Educational Researcher, 17 (5):5-8.

HARVARD UNIVERSITY, BOLT BERANEK & NEWMAN INC. 1983. Project Intelligence: The development of procedures to enhance thinking skills, final report. In conjunction with the Ministry of Education, Republic of Venezuela.

JONES, B.F., PIERCE, J. & HUNTER, B. 1988-89. Teaching students to construct graphic representations. Educational Leadership, 46(4), 20-25.

KOHLBERG, L. & GILLIGAN, C. 1971. The adolescent as a philosopher. Daedalus, 100: 1051-1103.

LIPMAN, M. 1976. Philosophy for children. Metaphilosophy, 7.

McCLOSKEY, M. 1983. Naive theories of motion. In Gentner, D. & Stevens, A.L. (eds.) Mental Models (pp. 299-324). Hillsdale, New Jersey: Lawrence Erlbaum Associates.

MOUTON, J., CLAASSEN, N.C.W., STRASHEIM, A. & VORSTER, J. 1990. English and operacy for primary school teachers - part II: A programme evaluation. UPTTRAIL Trust unpublished report.

NICKERSON, R., PERKINS, D.N. & SMITH, E. 1985. The teaching of thinking. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

NOVAK, J.D. & GOWIN, D.B. 1984. Learning how to learn. New York: Cambridge University Press.

ODENDAAL, M.S. 1985. Needs analysis of higher primary teachers in KwaZulu. Per Linguam Special Issue, 1.

ODENDAAL, M.S. 1986. Constraints analysis for the design of an English course for higher primary teacher training in KwaZulu and Ciskei. INTUS unpublished report.

ODENDAAL, M.S. & BOTHA, H.L. 1990. English and operacy for primary school teachers - part 1: English and operacy programme/package as a method to address the L2 medium problem in KwaZulu schools. UPTTRAIL Trust unpublished report.

OLSON, D.R. & ASTINGTON, J.W. In press. Talking about text. How literacy contributes to thought. Journal of Pragmatics.

PERKINS, D.N. & SALOMON, G. 1988. Teaching for transfer. Educational Leadership, *46*(1): 22-32.

PERKINS, D.N. & SIMMONS, R. 1988. Patterns of misunderstanding. An integrative model of misconceptions in science, mathematics and programming. Review of Educational Research, *58* (3): 303-326.

PRESSLEY, M., FORREST-PRESSLEY, D.L., ELLIOTT-FAUST, D. & MILLER, G. 1985. Children's use of cognitive strategies, how to teach strategies, and what to do if they can't be taught. In Pressley, M. & Brainerd, C.J. (eds.), Cognitive learning and memory in children: Progress in cognitive development research, (pp.1-47). New York: Springer-Verlag.

PRESSLEY, M. & BRAINERD, C.J. (eds.) Cognitive learning and memory in children: Progress in cognitive development research. New York: Springer-Verlag.

SALOMON, G. & PERKINS, D.N. 1989. Rocky roads to transfer: Rethinking mechanisms of a neglected phenomenon. Educational Psychologist, *2* (2): 113-142.

SCHWARTZ, S.H., PERKINS, D.N., ESTEY, G., KRUIDENIER, J. & SIMMONS, R. 1989. A metacourse for BASIC: Assessing a new model for enhancing instruction. Journal of Educational Computing Research, 5 (3): 283-297.

STERNBERG, R. 1981. Intelligence as thinking and learning skills. Educational Leadership, 39: 18-20.

THEMBELA, A. 1989. Black education in South Africa: Issues, Problems and Perspectives. Per Linguam, 5:2-8.

VAN DER VYVER, D. H. & BOTHA, H.L. 1989. The implementation and evaluation of suggesto-pedic/SALT language teaching in South Africa since 1984. HSRC report.

VAN DER VYVER, D. & CAPDEVIELLE, B. 1989. Towards the mountain: Characteristics and implications of the South African UPTTRAIL pilot project. Per Linguam, 5 (1):9-16.

WATZLAWICK, P. 1978. The language of change. Elements of therapeutic communication. New York: Basic Books, Inc.

WHIMBEY, A. with WHIMBEY, L.S. 1975. Intelligence can be taught. New York: Dutton & Co.

METHODOLOGICAL ISSUES IN EVALUATION RESEARCH:

A CASE STUDY

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INTRODUCTION

In June 1987, the Human Sciences Research Council was approached by members of the UPTTRAIL Trust to assist them in the design of a research project in order to evaluate the effectiveness of the English and Operacy Programme (EOP) which was to be implemented in KwaZulu in 1989. In this paper I discuss some of the more pertinent methodological issues which we had to take into account in the process of constructing an evaluation design for the project as well as in the actual evaluation process. Although the discussion is not exhaustive of the kind of issues involved in a project of this nature, it does give one a feeling for the complexity of such an undertaking.

The results of this project will be discussed under the following headings:

- Some definitions
- Considerations of validity in evaluation research
- The research design for the UPTTRAIL project
- The experimental design
- The sampling design
- The field study - monitoring the process of implementation
- Key findings of the study
- A methodological postscript

SOME DEFINITIONS

In his well-known book on evaluation, Rutman (1984:10) states that "programme evaluation entails the use of scientific methods to measure the implementation and outcomes of programs for decision-making purposes".

"Programme" is taken to refer to an intervention or set of activities mounted to achieve external objectives, that is, to meet some recognized social need or to solve an identified problem (Rutman 1984:11). In terms of the definition of programme evaluation, the following type of question is usually asked in the process of programme evaluation:

- How is the programme carried out?
- Is the programme implemented in the prescribed manner?
- Is the target population reached?
- What are the outcomes of the programme?
- How could the programme be delivered more effectively to the client population?

Key terms used in programme evaluation are the following:

Programme objectives
Programme structure
Summative evaluation

Let us discuss each of these terms briefly:

Programme objectives are the formally stated ends to the achievement of which the programme's resources are directed. Often these objectives are stated in vague terms, for example to improve social functioning, to increase community integration or to enhance individual fulfilment. It is therefore one of the first steps in the management and subsequent evaluation of a programme to clarify and define these objectives.

Programme structure refers to the inherent logic of the programme, i.e. to the proposed cause-and-effect relations in the programme. A programme structure comprises various (causal) linkages which together constitute the overall structure or logic. Take for example the family-counselling component of an urban welfare programme. Its output is measured by the number of clients counselled. Its immediate objective is to reduce anxiety. Intermediate objectives might include better family relations, with as ultimate objectives better functioning on the job and improved social relations in general. Programme evaluation is primarily directed to these cause-and-effect relations. It discovers such relations and either confirms or refutes their validity. A schematic representation of the programme structure and the major causal relationships is provided later.

It is important to note that programme evaluation is concerned both with the *implementation* and the *outcomes* of a programme. The close relationship between implementation and outcome is clear: it is essential first to know whether a particular programme had been implemented well and then to assess the outcomes of the programme. As Rutman (1984:13) correctly states: "Failure to look at programme implementation presents a dilemma. Was the programme poorly implemented, or was it truly ineffective? Unless the evaluation documents the manner in which the programme was implemented, the goodness of the idea underlying the programme cannot be differentiated from the quality of programme administration".

It is for these reasons that the UPTTRAIL Trust also commissioned the HSRC to monitor the implementation of the EOP. The results of this study are reported in the following sections.

CONSIDERATIONS OF VALIDITY IN EVALUATION RESEARCH

In general *research design* refers to the logic of decision-making in research. The aim of research design is to enhance the validity of the research results. In programme evaluation the design likewise refers to the plan or *logic of the programme*, whereas the specific aim of an evaluation design is to structure the programme in such a way as to maximize the likelihood of drawing valid conclusions.

Where quantitative results are required, summative evaluations generally involve the implementation of an experimental or at least quasi-experimental design.

One of the first steps in constructing such a design is to get clarity on the methodological requirements demanded by the study, i.e. considerations regarding *validity*. It has become accepted practice, following Campbell and Stanley (1963), to distinguish between the *internal* and *external* validity of a project. In Mouton and Marais (1988) internal validity was further subdivided into theoretical validity, measurement validity, reliability and inferential validity. Theoretical validity refers to the validity of the constructs used in the study; measurement validity refers to the validity of the measuring instruments (scales, tests, etc.); reliability refers to reliability of the data collected and inferential validity refers to the validity of the conclusions one draws regarding the existence or not of causal relationships between variables (Cook and Campbell [1979] call this "statistical conclusion validity"). External validity is synonymous with *generalizability* and refers to the basis on which one can generalize the results of one's study to other groups, settings and periods.

In constructing the design for the EOP, we had to identify specific threats to validity to be expected in such a project. In their classic work of 1979, Cook and Campbell identified no less than 19 such threats which typically occur in experimental research. We decided that the following five threats were particularly relevant to the present project and that the design should take these factors into account.

History

"History" is a threat when an observed effect is due to an event taking place between the pretest and the posttest (which is not the treatment of research interest). In the present project, this posed a real threat given the fact that there would be a period of approximately ten months between pretesting and posttesting of pupils. During this period the pupils would be exposed to a variety of stimuli other than the experimental intervention.

Maturation

This is a threat when an observed effect might be due to the experimental subjects becoming older, wiser and more experienced between pretest and posttest. Maturation, too, was relevant to the present project where subjects would grow older and would be expected to learn more during the course of the year. However, with the use of control groups, and on the assumption that maturation takes place equally in the experimental and control groups, this did not pose an insurmountable obstacle.

Selection bias

This refers to the situation where an effect may be due to the difference between the kinds of people in one experimental group as opposed to another. This is particularly true of quasi-experimental research where randomization is precluded. In the present projec: this only partially applied, since some degree of random allocation of subjects was obtained. This is explained in more detail in the section on **Sampling** below.

Diffusion of treatments

When treatments involve informational programmes and when the various experimental (and control) groups can communicate with each other, respondents in one treatment group may obtain the information intended for others. The experiment may therefore lose validity due to the loss of planned differences between experimental and control groups. Although diffusion was initially thought to pose a real threat to the present project, we are now convinced that the particular design adequately controlled for this.

Hawthorne effect

When the experimental treatment leads to certain desirable outcomes (as expected) there is always the possibility that the experimenters (in this case the teachers), expecting certain performances from their subjects, might unintentionally give higher grades, be more supportive, etc. The design constructed for the study did, however, meet this threat explicitly through the introduction of the follow-up / no follow-up factor in the experimental group.

It is important to note as a general point that any single design is seldom able to control for all possible threats to validity. The choice of a particular design is always the choice of the best possible design given the constraints of time, money and manpower.

THE RESEARCH DESIGN FOR THE UPTTRAIL PROJECT

The experimental design

The design selected (which Cook and Campbell calls the "untreated control group design with pretest and posttest") did control, as we have indicated, for many of the abovementioned threats. The basic design can be represented as follows:

	URBAN		RURAL	
	STD 8	STD 10	STD 8	STD 10
WITH EXPERIMENTAL FOLLOW-UP GROUP	4	4	4	4
WITHOUT	4	4	4	4
CONTROL GROUP	4	4	4	4

[Notation: M = measurement and X = treatment or intervention]

In terms of the specific content of the EOP, this translates into the following two schemas - where the interventions regarding the teachers and the pupils have been separated.

PHASE 1:

Where **M1/M2** = measures on the different measuring instruments and X = Suggestopedia/SALT teaching method. The time difference between M1 and M2 was three weeks, whereas M3 refers to the follow-up tests at the end of the school year.

PHASE 2:

Where **M3/M4/M5** = measures on different standardized tests (such as the Initial Evaluation Test in English or IETE) and M6 = examination results in Mathematics, English and Social Studies; X = tuition by teachers who had undergone the Suggestopedia/SALT course.

The foregoing proposals have been summarized in the final factorial design used in the study. This design also formed the basis for the sampling done by the HSRC.

Some notes:
Three variables were identified as being very important in stratifying the sampling of the respondents and in order to control for certain threats to validity:

- Differences between teachers and pupils coming from urban and rural areas respectively;
- The educational qualifications of teachers (those with matric plus some diploma or degree and those with Std 8 plus some diploma / certificate);
- With regard to the experimental group only - between those who would receive follow-up visits from the INTUS staff members and those who would not. The last division should ensure that any potential Hawthorne effects be identified.

As it turned out, certain practical constraints made it impossible to obtain the intended design. These constraints and the actual sampling procedure are discussed next.

The sampling design

Considerations to be taken into account in designing the sample were twofold: on the one hand, the requirements of the factorial design; on the other, certain practical requirements expressed by the INTUS staff. The latter were:

- That approximately half the teachers in the experimental group had to be drawn from schools where two classes could be included in the sample. The reasoning behind this was that it would ensure that a substantial number of the teachers in the experimental group could rely upon the support of a colleague in the same school with the implementation of the new method.
- That schools had to be chosen which would be accessible for visits in the course of the year. Accessibility here refers both to geographical considerations (some of the schools in the circuits are in very remote areas and their inclusion would have made the project extremely costly) and to political considerations (already in 1989 there were signs that certain schools, especially in the Pietermaritzburg area, might not be open and accessible to the researchers for the whole year).

Given these practical considerations, the eventual sampling comprised the following steps:

1. A complete list of all the primary schools under the jurisdiction of the KwaZulu Department of Education was obtained. This list had already been ordered according to circuit and included the names of the Std 3 teachers and their qualifications.

2. After consultation with the Department of Education and INTUS staff members, four circuits (out of the total of 25) were identified for inclusion in the projects. We were informed by the department that of these four circuits, two were predominantly urban (Umlazi North and Umlazi South) and two more clearly rural (Enseleni and Hlabisa). They were also regarded as accessible circuits in both senses mentioned above. Furthermore, all four circuits comprised sufficiently large numbers of schools to make further selection possible.

3. The next step was to identify those schools which could qualify for inclusion in terms of the following two considerations: first, schools with more than three Std 3 classes were included because this would make it possible, in some cases, to select two teachers from the same school and still have some leeway in case of selection problems; secondly, schools were chosen on the basis of the qualifications of the teachers - equal numbers of Std 8 and Std 10 teachers being included as far as possible. This last consideration turned out to be a major problem. In the circuits chosen, the proportion of Std 10 to Std 8 teachers was approximately 4 to 1, which meant that it was impossible to meet this particular demand of the factorial design. In the final sample, 12 of the 48 teachers selected had Std 8 (plus some diploma).

4. Based upon the considerations outlined so far, a list of the schools which qualified for inclusion in the sample was drawn up. From this list, 54 teachers were identified through a process of controlled selection (the additional 6 were included to enable substitution should the required number of 48 teachers not be available at the commencement of the training programme).

5. Finally, from the list of 54, the teachers were allocated at random to the experimental and control groups, and the experimental teachers were then also allocated at random.

The field study

Given the constraints prevalent in schools in KwaZulu, such as large classes, poor infrastructure, underqualified teachers, etc., it was deemed essential that the monitoring component would comprise in situ observations of all (experimental and control) classes. These observations were carried out during four week-long visits to the schools by the monitoring team.

To enable the team to carry out its brief, the members attended part of the training to acquaint themselves with the overall objectives and specifically the demands that proper implementation of the programme would make on the teachers.

The modus operandi during each visit comprised the following steps:

- A preliminary session with the principal of the school during which his/her impressions of the teacher, as well as the method, were noted.
- An observation session in the classroom, normally lasting between 45 and 75 minutes, of which the main component was completion of a structured observation schedule.
- A concluding unstructured interview with the teacher during which his/her impressions and experiences of the method were noted.

The main objective of the classroom sessions (experimental group) was to establish the extent to which the following key elements of the programme were present:

- The initial (physical and mental) relaxation exercises
- Use of recorded music
- Games and singing
- Concerts
- Teaching of thinking skills
- Small-group work
- Peripherals (wall posters)

Teachers in both the experimental and control groups were assessed on the following categories derived from a structured observation schedule:

- Utilization of pupil skills and abilities
- Learning opportunities and opportunities for exercises offered by the material
- Pupil motivation
- Flexibility of material and procedures
- Teacher / pupil roles
- Pragmatic considerations

Scores thus obtained were used to rank the teachers. This ranking formed the basis of a classification into two groups: in the case of the experimental group between those implementing the programme properly and those who did not; in the case of the control group between those deemed to be good teachers and the others.

KEY FINDINGS OF THE STUDY

In order to put the findings of the study in the proper perspective, we have to return to the programme model of the EOP. This is presented schematically in Figure 1. Based upon this model, it is clear that the main hypotheses of the study postulated the following three major causal processes:

Causal process No. 1:
It was hypothesized that the experimental intervention (the English and Operacy Training Programme) would lead to an immediate [Arrow Ia] and long-term [Arrow Ib] improvement in the cognitive, communicative and affective skills of the teachers.

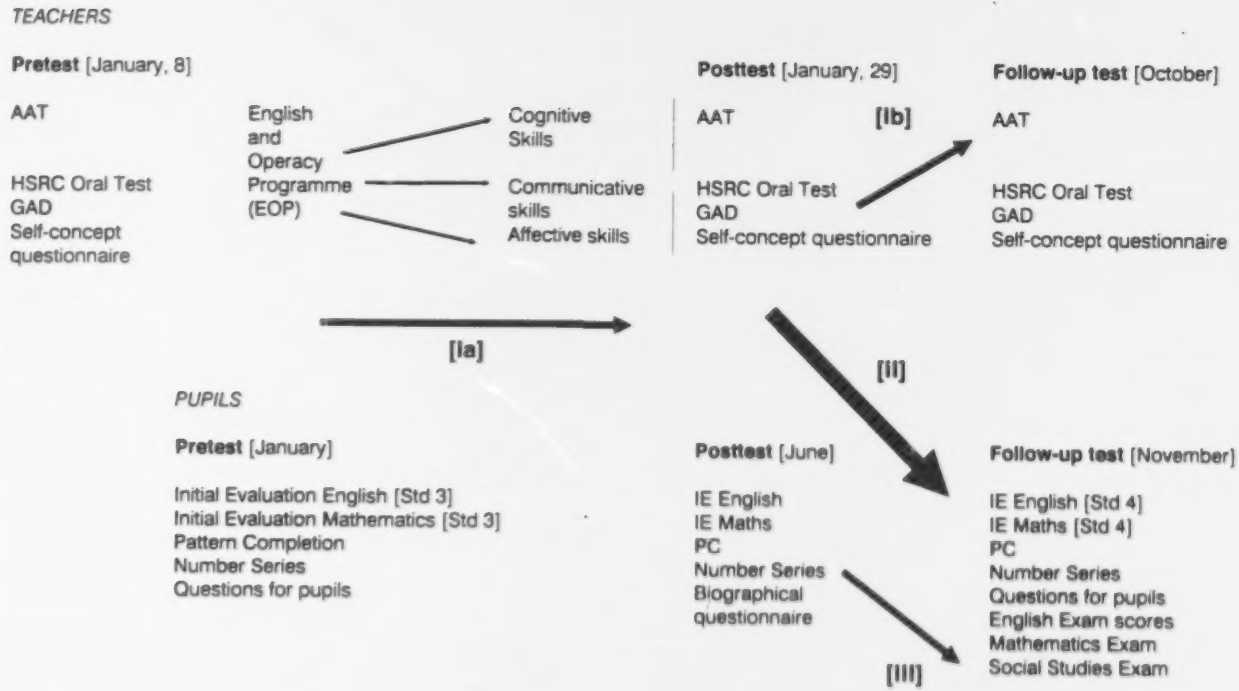
Causal process No. 2:
The main hypothesis of the study postulated that the pupils in the experimental classes, compared to the pupils in the control classes, would similarly show an improvement in their cognitive, language and even certain affective skills [Arrow II]. Scores attained on various standardized instruments, as well as the end-of-year examination marks, were used in the testing of this hypothesis.

Causal process No. 3:
A final hypothesis postulated that the experimental pupils would benefit not only directly from the new method of training, but that their achievement in subjects other than English and to some degree even Mathematics, would show an improvement. To test this hypothesis end-of-year results in Social Studies and Mathematics of the experimental and control classes were also compared [Arrow III].

Teachers

We were specifically interested in testing whether there occurred a significant increase in the Academic Aptitude Test (AAT) scores of the teachers in the experimental group compared to that of the control group. This hypothesis had two components:

[1] Whether there occurred an increase from the pretest to the posttest: this would indicate that the training programme had an immediate effect.


TEACHERS
Pretest [January, 8]
AAT
HSRC Oral Test
GAD
Self-concept questionnaire
English and Operacy Programme (EOP)
Cognitive Skills
Communicative skills
Affective skills
Posttest [January, 29]
AAT
HSRC Oral Test
GAD
Self-concept questionnaire
[Ib]
Follow-up test [October]
AAT
HSRC Oral Test
GAD
Self-concept questionnaire
[Ia]
[II]
PUPILS
Pretest [January]
Initial Evaluation English [Std 3]
Initial Evaluation Mathematics [Std 3]
Pattern Completion
Number Series
Questions for pupils
Posttest [June]
IE English
IE Maths
PC
Number Series
Biographical questionnaire
Follow-up test [November]
IE English [Std 4]
IE Maths [Std 4]
PC
Number Series
Questions for pupils
English Exam scores
Mathematics Exam
Social Studies Exam
[III]

[2] Whether there was an overall improvement from the pretest to the follow-up test at the end of the year. Were this to be the case, one would have grounds for believing that the programme's effect, if any, is to some extent durable.

1. The first model which was fitted, tested whether the EOP had an immediate effect on the cognitive and language-related skills of the teachers: it was hypothesized that differences in the posttest scores could best be explained by the differences in the initial pretest scores and the differences between the experimental and the control group.

2. The second model which was fitted, tested whether the EOP also had a long-term effect on the cognitive and language-related skills of the teachers. Again it was hypothesized that differences in the follow-up tests scores of the total group could best be explained by the differences in the initial pretest scores and the differences between the experimental and the control group.

The results of these analyses reveal the following:

The EOP clearly led to an improvement in the non-verbal reasoning skills of the experimental teachers compared to those of the control teachers. In terms of the model, the predicted short-term improvement would amount to 18 % and the long-term improvement to 17 %.

The only other (somewhat marginal) result would suggest that the EOP led to some short-term improvement in the verbal reasoning skills (11 %) of the experimental teachers. This effect however, disappears over the long term.

The EOP did not have a significant effect on the vocabulary or the comprehension skills of the teachers.

To summarize:

As the results show, the only statistically significant differences which were found between the experimental and the control groups from the pretest to the follow-up test were in the area of reasoning (especially non-verbal) skills. This suggests that the training programme had some short-term and long-term effect on the more clearly cognitive skills of the teachers. However, there is no evidence that the EOP had a short-term or long-term effect on the more language-based skills such as comprehension and vocabulary. This, of course, does not in itself imply that the training programme could not lead to an improvement of the language skills of the pupils, as they would be exposed to a comprehensive set of course material in which the basic skills taught in the EOP have been integrated.

One of the main hypotheses of the study is that the effect of the training programme would not be confined to the cognitive level only, but would also be evident on the affective level. On the basis of suggestopedic theory, one might expect that teachers participating in such a training programme would show an improvement in their self-concept compared with teachers in the control group. According to theory, this improvement should already be evident immediately after training and should be maintained and even reinforced throughout the year as the teacher becomes more competent in the use of the programme material.

An analysis of covariance was done to test whether significant changes occurred in the self-concept ratings between the pretest and the posttest on the one hand, and between the pretest and the follow-up test. None of the differences between the experimental and the control groups were found to be significant. This suggests that the EOP did not have an effect on the self-concept of the teachers. However, one should allow for the possibility that the instrument was not valid. The experience of the monitoring team was that the teachers in the experimental classes showed more confidence and were more relaxed and enthusiastic compared with their counterparts in the control group. Whether these aspects are indicative of a higher self-concept and whether self-concept is a construct which can be changed through a three-week training course, is a different matter.

Field study

The most important conclusion of the monitoring study is that undergoing training in the suggestopedic method does not necessarily result in the ability to implement it. There are certain abilities and dispositions that seem to be as necessary as the relevant training. By the very nature of the method, which requires spontaneous and authentic communication, a reasonable control of English and a basic teaching talent are indispensable. During the monitoring process it was found that only a third of the teachers met these requirements and were therefore able to implement the training programme properly.

Proper implementation and good quality teaching implied the following. The relaxation exercises were carried out with feeling and authentically. Correct utilization of the games and songs had a very positive effect on the motivation and participation of the children. Where it was not done properly, they became a substitute for true learning and were clearly used by the teacher to cover his/her own inadequacies. Small group work which would lead to the spontaneous participation by all pupils were used correctly. The monitoring team witnessed how the effective use of the small group approach also had an effect on the affective level - the pupils not only participated more but were not afraid to speak English out loud. But the mere concept of a small group does not guarantee participation and communication. On a number of occasions, pupils were divided into small groups only to be left on their own, without any guidance and discipline. This would either lead to only one in the group actually working, while the others sit by passively, or to total chaos (as observed in one class).

Another core element of the method is the way in which a whole series of thinking tools are integrated into the course material. The difference between the proper and improper use of these thinking tools was very obvious to the monitoring team. In the latter case, for instance, the pupils might still be able to list the various tools, but would not be able to explain their meaning or use them. In some cases, it was found that they were actually being taught the wrong explanation of the meaning of an acronym (e.g. AGO's is Aims, Goals and *Objections*, instead of Objectives).

Probably the most important set of categories in the observation schedule, revolves around teacher / pupil roles. Negative teacher / pupil interactions were observed to occur in various cases, e.g. where the teacher was very authoritarian or unduly strict, when the teacher would lose control and even shout at the pupils or alternatively where the teacher would be so indecisive and unassertive that no discipline was exercised. In all these cases, participation by the pupils was not encouraged, the pupils were not motivated to communicate and speak freely. The very opposite picture emerged in those classes where one encountered a good teacher. This would be somebody who was in control and composed, who could exercise discipline judiciously and, very important, somebody who was also a good actor - even an entertainer. Such a teacher usually was self-confident and had good interpersonal skills. This inevitably led to a situation where the children felt free to speak out and participate.

Another important aspect which was assessed during the classroom sessions, was the teacher's competence in English. Poor English was evidenced by the fact that the person dit not speak English spontaneously and in general provided a very poor pronunciation model for the pupils. Also, the spelling / vocabulary would be poor (e.g. *erned* instead of earned and *adventures* rather than adventurous).

Another category in the observation schedule refers to the extent to which the teacher succeeded in utilizing a whole range of pupil skills. A common error made by the poorer teachers, was to focus on metalinguistic explanations of grammar, i.e. to talk about tenses and grammar rather than encouraging communication. Another common mistake observed, was the tendency to elicit one-word responses. This then merely became an exercise in auditory retention instead of communication.

The monitoring team also checked whether the teachers were able to use and adapt the material and procedures to the specific circumstances. It was found that the good teacher who understood the content and objectives of the method, was also invariably sufficiently flexible to adapt the material to the specific teaching context. Such a teacher would, for example, understand the true role and meaning of the relaxation exercises, the games and singing, etc. and implement these in the correct way. More often than not, the poor teacher could not cope with these "novelties" and would lose control of the teaching situation.

Children

In terms of the stated objectives of the English and Operacy Programme, two areas were of particular interest: the cognitive and English language skills of the pupils. The results are discussed in terms of these two main areas.

ENGLISH LANGUAGE SKILLS

The main hypothesis of the study was that the English and Operacy Programme would lead to a substantial improvement in the English language skills of the children. One can safely state that the research which has been done in this project unequivocally validates this hypothesis. Through a series of analyses it has been shown that children in the experimental classes (irrespective of the model fitted) did in fact do better both in the examination English and the standardized English tests. This fact has been substantiated in a variety of ways:

- Through exploratory XAID analyses
- Through a series Analyses of Covariances
- In terms of expected pass rate

In Figure 2 a number of subgroups are compared on examination English. The result of this XAID shows clearly how the subgroups in the experimental groups (poor environment) (56,7 and 50,5) did better than the first two subgroups (control and poor environment) (51,6 and 42,6). The two subgroups which did best had the benefit of a fair environment with the subgroup receiving proper implementation (69,2) doing best overall. The difference in class size (medium or large) indicates a tendency in favour of medium-sized classes.

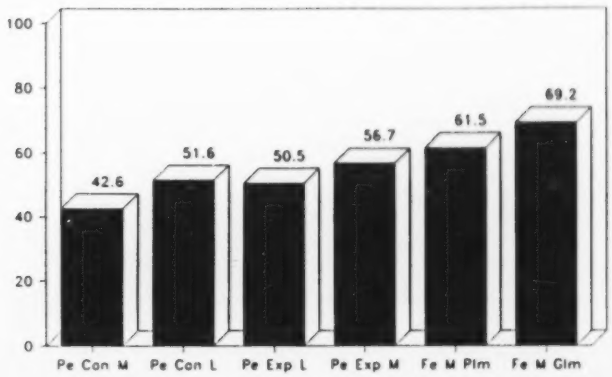


Figure 2: Comparison of subgroups on examination English [XAID]

Figure 3 summarizes the results of the Analysis of Covariance on examination English. Here again the experimental classes outperformed the control classes in every case - irrespective of the environment of the pupils and the size of the class.

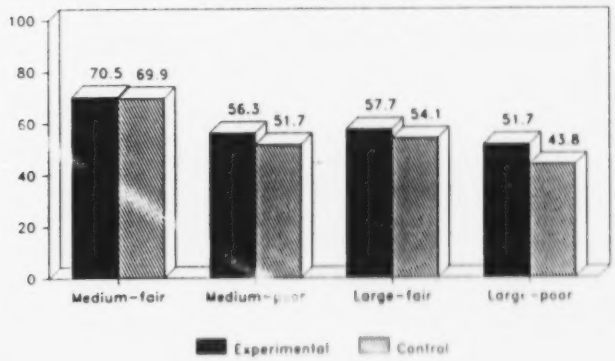


Figure 3: Comparison of pupils' scores on examination English

Even more positive results were obtained in the case of Social Studies. In Figure 4 a comparison of four subgroups (XAID) reveals that the pupils in the experimental group (and medium-sized classes) did the best by a large margin.

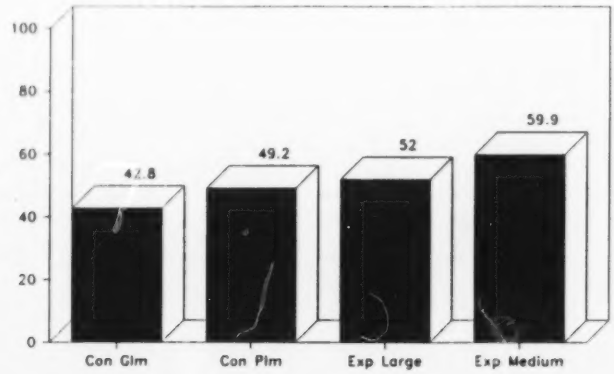


Figure 4: Comparison of subgroups on examination Social Studies [XAID]

Similar results were obtained in the ANCOVAs (Figure 5). A comparison between experimental and control classes reveals that the pupils in the experimental classes did significantly better than their counterparts in the control classes in three of the four comparisons.

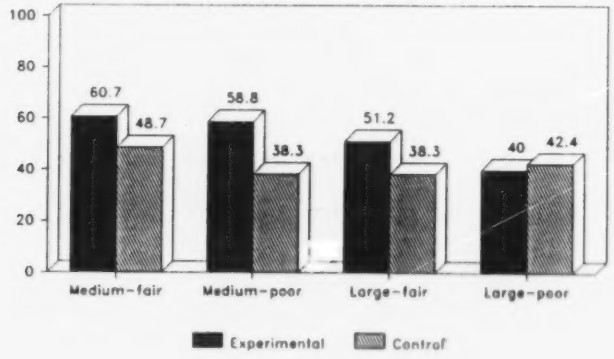


Figure 5: Comparison of pupils' scores on Social Studies

Finally, if one compares the expected percentage of pupils who would pass in the experimental classes compared to the control classes, the pupils in the experimental classes again would come out best (Figure 6) both in English and Social Studies.

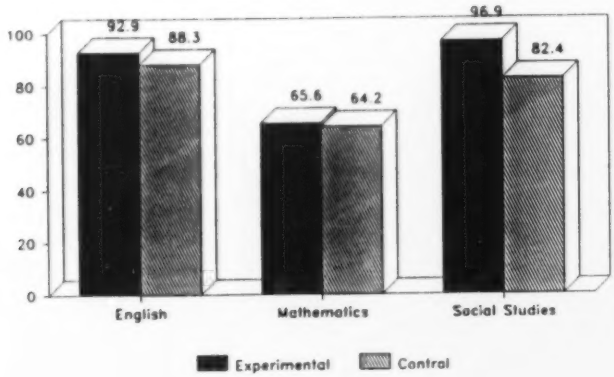


Figure 6: Expected percentage of pupils who will pass

A very important validation of the effectiveness of the English and Operacy Programme is to be found in the fact that the improvement has clearly been transferred to a subject such as Social Studies. The size of the differences between experimental and control group children under the various models is also always quite large (ranging between 12 and 21 %). This compares well with the observed difference between the experimental and control groups of 17 %.

In general, then, the EOP has been found to lead to a substantial improvement in the English language skills of the children. In terms of the experience of the monitoring team in the classrooms this must be ascribed to both the innovative teaching methods used by the teachers, and the course material.

COGNITIVE SKILLS

The results of the EOP at the level of mathematics and other non-verbal reasoning skills are less straightforward. The research shows that the children in the experimental groups (all three models) would not be expected to do better in examination Mathematics than their counterparts in the control classes. Similar findings were obtained for the standardized Mathematics tests where no significant differences between experimental and control classes were found.

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However, the quality of teaching and implementation did make a difference in examination Mathematics. Under the general model, 15 % more children who receive proper implementation would be expected to pass Mathematics than those who receive poor quality teaching. This is in line with the results of the field study, where the monitoring team saw that the proper implementation of the programme, and especially of the thinking tools, made a real difference.

It seems as if at least two factors might account for the fact that the EOP did not have any noticeable effect on the children's performance in Mathematics: the quality of the teaching and the very low average scores attained in Mathematics (the average of 41 % in the end of year examination is a mere 8 % above the pass level).

These findings are similar to those found with regard to the results of the scores on the two non-verbal tests (Pattern Completion and Number Series). Here again, no significant differences were found between the experimental and the control children.

METHODOLOGICAL POSTSCRIPT

In this concluding section, I wish to emphasize some of the very important methodological lessons which we as research team learned in the course of the nearly three years that we were involved in this project.

* Probably the most important lesson learned, was that the interplay which was established between process and outcome evaluation in this project was of the utmost importance when we reached the stage of analyzing the results. The more qualitative process evaluation component shed light not only on the way in which the new teaching method was being implemented, but also on the way in which the actors - in this case the teachers - understood and gave meaning to this process. By becoming involved, through participant observation and non-directive interviewing over a one-year period, the research team managed to gain some insight into this process as well as the various factors - environmental, political, social, etc. - which all played a role in the dynamics of implementing a new teaching method. But, and this is even more important, it provided us with the necessary background knowledge to interpret the quantitative results obtained from the outcome evaluation component. It is fair to say that without this qualitative knowledge, we would not have been able to come to such a clear understanding of the results from the various psychometric and structured tests.

* Because of constraints of time and manpower, it was impossible to design tailor-made tests for the children or teachers. We had to rely on standardized tests to evaluate the

cognitive, affective and language skills of teachers and children. In many cases, these tests were developed some time ago and in most cases could not be regarded as being optimal measures for detecting the expected changes in cognitive and language skills. One of the meta-evaluators (Lipsey 1990: Appendix 9/2) quite rightly recommended:

> Subsequent research on this program should include some 'proximal' measures of those responses and skills expected to change as an immediate effect of the training, e.g. liking the English class and liking school, aural and oral language skills. Such measures should be more responsible to change produced by the program and would provide information on the intermediate changes that bridge to any broader changes indexed by examination marks, proficiency tests and self-esteem measures.

In any future programme evaluation, we would probably insist that at least some of the performance measures be tailor-made to the task at hand, even if it means rescheduling the actual project.

* Finally, in an effort to ensure the "integrity" of the evaluation design, the research team insisted that the demands of the experimental design be followed meticulously. Although this in itself is not wrong, it became clear, in retrospect, that more provision should have been made for supporting the teachers in implementing the new teaching method during the course of the year. This is a case where methodological considerations were followed perhaps too strictly without giving proper consideration to the "human" requirements regarding support, feedback, reinforcement, etc. Again, in his report on the study, Lipsey *(ibid.)* comments:

> This project clearly had major implementation problems; indeed, they were so substantial that it's a wonder there were detectable effects at all. Any future efforts should give close attention to better training for the teachers and, perhaps, better support in the field to help them maintain the training.

In the final analysis, methodological issues - and this is perhaps the main lesson learned in this study - are embedded in a dynamic social process where a number of other, equally valid considerations are important. Successful research, also programme evaluation, means that one has succeeded in striking a healthy balance between these various considerations.

REFERENCES

CAMPBELL, D.T. & STANLEY, J.C. 1963. Experimental and quasi-experimental designs for research on teaching. In N.L. Cage (ed.) Handbook of research on teaching. Chicago: Rand McNally.

COOK, T.D. & CAMPBELL, D.T. 1979. Quasi-experimentation. Chicago: Rand McNally.

LIPSEY, M. 1990. Review of "English and operacy for primary school teachers". In J. Mouton *et al.* 1990.

MARK, M.M. & COOK, T.D. 1984. Design of randomized experiments and quasi-experiments. In Rutman 1984.

MORRIS, L.L. & FITZ-GIBBON, C.T. 1978. Evaluator's handbook. London: Sage Publications.

MOUTON, J., CLAASSEN, N.C.W., STRASHEIM, A. & VORSTER, J. 1990. English and operacy for primary school teachers: A programme evaluation. Pretoria: Human Sciences Research Council.

MOUTON, J. & MARAIS, H.C. 1988. Basic concepts in the methodology of the social sciences. PRETORIA: HSRC.

RUTMAN, L. 1984. Evaluation research methods: A basic guide. London: Sage Publications.

AN ARCHITECTURAL MODEL FOR THE TEACHING OF THINKING

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INTRODUCTION

Traditionally, certain segments of the population have been excluded from the economic mainstream. Since there is usually some correlation between economic access and educational achievement, this social imbalance can never be successfully addressed without a careful analysis of those factors which predicate educational access. It has become customary to delineate such causes along socio-economic lines in South Africa. This usually takes the form of the teacher/pupil ratio, underqualification of teachers, etc. And in South Africa the pernicious problems of inequality in general and inferior educational provision in particular are further exacerbated by racial discrimination.

While all these factors are obviously contributory, they cannot be the only factors that are entirely relevant to the answer since societally disadvantaged persons, even in affluent countries, often find education prohibitively inaccessible in itself and especially in disciplines such as the natural and economic sciences. What this paper will focus on are factors intrinsic to the subject matter itself and how these relate to the cognitive repertoire of learners from disadvantaged communities. An attempt will be made to develop a model which improves thinking skills through subject instruction while improving access to various disciplines through a development of thinking skills.

SOME ILLUMINATING STATISTICS

Resnick (1987) recently produced a very persuasive characterization of the present educational system under the heading of "mass education". She shows how "schools and related institutions established to train an intellectual elite, drawn largely from privileged social strata, in capabilities of reasoning, rhetoric, mathematical and scientific thought, and other skills that today carry the higher order label" have changed. Instead, with the growth of urban populations, mass education has become the rule. It has been characterized as "inculcating routine abilities: simple computation, reading predictable texts, reciting religious or civic codes. It did not take as goals for its students the ability to interpret unfamiliar text, create material others would want and need to read, construct convincing arguments, develop original solutions to technical or social problems".

If this serves as a description of general educational practice in lands of privilege such as the United States, then it is clear that in developing, third world countries educational problems are endemic. Add to this the inequitable educational spending based on racial lines in South Africa [$198 per white pupil as opposed to $73 per black pupil per year according to Moulder (1989)] then it is not surprising that black education in the country is in a state of crisis. Notice how this is underscored by Hofmeyr and Spence (1989:37):

> The Std 10 (grade 12) pass rate in African education is low. In 1987 only 56% passed of those who wrote, and only 28%, some 25 000 students, obtained a matriculation exemption for university entrance. However, when the number of students who obtain matriculation exemption with higher grade mathematics and science is calculated, then the pool shrinks to a mere 500 - 800 students per year. Statistics of the Department of Education and Training (DET) for 1987 show that in the Johannesburg circuit which includes Soweto and Alexandra, only 41 passed of the 1 558 who wrote mathematics at the higher grade, and only 24 passed of the 601 who wrote physical science at the higher level. Only 14 and 8, respectively, passed mathematics and science with at least a 'D' symbol, the requirement for entry to the faculties of Commerce and Engineering at the "open" universities.

It is worthy of note that the disadvantaged learner, even with a fair education system, is also severely prejudiced with regard to access especially in science and mathematics-related disciplines. A recent article in the Washington Post (7 August 1988:4) under the heading "Blacks Earn Few Science Doctorates, Study Says", noted:

> Black students earned only 222 or 1.8%, of the 12 480 doctorates awarded to US citizens in graduate science and engineering programmes last year, according to figures released by the National Science Foundation.
>
> Blacks received three of 281 doctorates in chemical engineering, two of 240 doctorates in mechanical engineering and five of 698 doctorates in physics and astronomy. In biology, the proportion was slightly better - 45 of 2 971.

So while mass education has certainly had effects overall, on disadvantaged persons the effects have been devastating with respect to access to certain fields of study. Given, as Resnick points out above, that mass education is not focused heavily on the development of higher-order thinking skills, a fruitful area of investigation to determine reasons for the poor access of disadvantaged students (and indeed many others) may well be to find a match between the cognitive requirements of a discipline and the cognitive repertoire of the learner.

INVESTIGATING THE MATCH

The teaching/learning situation has an obvious dichotomy: the learner and what is to be learned. Shayer and Adey (1981) have attempted to determine a measure of the mismatch, doing so in Piagetian terms. Given the breadth and extent of the "thinking skills movement" throughout the eighties, it is surprising that this obvious instructional reality has received so little attention (Adey 1988). Indeed, for disadvantaged learners, the literature is even more sparse (Mehl 1985).

By way of illustration of the cognitive operations demand (COD) intrinsic to the content itself, consider two examples, one drawn from a problem-solving situation in kinematics, the other related to concept understanding. While both are drawn from physics, they illustrate the situation rather than requiring too much content knowledge.

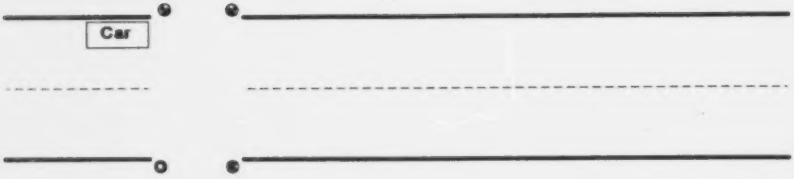
A problem-solving situation

The following problem is typical of the kind required of physics freshmen after completing the kinematics section of the course:

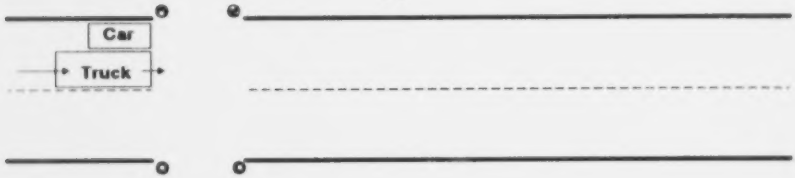
> At the instant the traffic light turns green, a car starts from rest with a constant acceleration of two metres per second squared. At the same instant a truck, travelling at a speed of ten metres per second passes the car.
>
> (a) How far beyond the starting point will the car overtake the truck?
>
> (b) How fast will the car be travelling at this time?

In a series of interviews conducted with students as they attempted to solve this problem (after having received the relevant instruction) it was clearly demonstrated that they had little difficulty deciding which equations applied to the situation. However, no solution can be obtained by simply plugging values given into the equations. Rather, the following five positions are relevant:

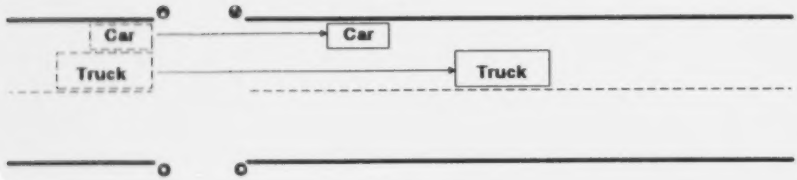
(i)


Car

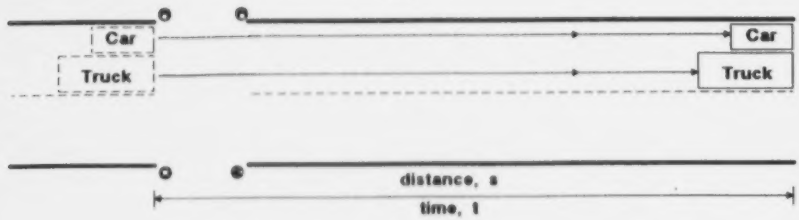
(ii)


Car
Truck

(iii)


Car
Car
Truck
Truck

(iv)


Car
Car
Truck
Truck
distance, s
time, t

The cognitive operations which are thus implicit in dealing with this problem, include the following:

Visualization

Without being able to form a picture of the relative movements, it is almost impossible to solve the problem.

Qualitative evaluation

Thinking through the detail of the problem statement rather than plugging values into equations, is essential.

Goal analysis

Choosing (iv) rather than (iii) for the purpose of this problem indicates that the problem solver knows what the actual problem is.

Extracting implicit data

Nowhere is it explicitly stated that the distance travelled and the time taken are the same for each vehicle.

Relating two sources of information

Without relating the motion of truck and car, no solution to the problem is possible.

After executing the above, a solution is easily obtained.

Concept understanding

As an example here consider what is involved in understanding Newton's First Law:

> A body will remain in a position of rest or of uniform motion in a straight line unless acted upon by an unbalanced force.

Some of the cognitive operations which are relevant in developing an understanding of this law, include:

Careful word analysis

Essential words such as "body", "at rest", "force" need to be highlighted. Our research demonstrates that the two negatives, "unless" and "unbalanced" form a basis for confusion.

Establishing relationships

The relationship between the "body" and "the forces upon" needs to be established.

Extracting implicit data

It is implicit that a body "at rest" and a body travelling with "uniform motion in a straight line" are in the same condition from the standpoint of Newton's First Law.

Additionally, the expression "unbalanced force" in this context actually implies that at least two forces act on the body.

Contextual relationships

It is only within the context of this law that an "in a position of rest" situation is the same as one of "uniform motion in a straight line".

Developing a procedure for application (planning)

It is necessary in using the law in a problem-solving situation to be able to develop the sequence of application. In the present case it is necessary to:

1. identify the body involved;

2. determine the forces acting upon the body; and

3. to make the sum of forces = zero.

Clearly the cognitive operations demanded in using Newton's First Law in anything other than a rote-learning mode, is considerable.

All our research with disadvantaged students demonstrates that it is precisely these cognitive operations which they do not display. It is clearly not an automatic part of their cognitive repertoire (Mehl 1985; 1989). This is hardly surprising given the tradition of rote-learning to which they have been exposed. So this is no value judgement on their capabilities. The essential point, however, remains: if the cognitive operations demanded by the specific area of content are not disembedded from the content, and if students are not explicitly assisted to develop the ability to use these, they will simply not be able to deal with this area of content. It will remain inaccessibly difficult in spite of all the effort they put into learning the textbook content and attempting to solve problems. While this may sound excessively dramatic, results over the years at the University of the Western Cape (which has a majority of students who may be categorized as disadvantaged, for a variety of reasons) in the Faculties of Natural and Economic Sciences, attest to the truth of this premise.

LOCATING WITHIN THE PRESENT CONTEXT OF TEACHING THINKING

While it is possible to group a large number of aspects under the rubric of teaching thinking, a broad division can be made around the issue of content. As Nickerson (1988:29) notes:

> A question that has been the topic of some debate is whether thinking is best taught in a "content-free" way, say in stand-alone courses that are adjuncts to the standard curriculum, or as an integral part of traditional content courses.

Let us examine the question of accessibility to various disciplines in the light of this division.

Domain-independent: Stand-alone approach

Probably the three largest courses which fit under this heading are Feuerstein's Instrumental Enrichment (1980), de Bono's CoRT Thinking Programme (1975) and Project Intelligence/Odyssey (Herrnstein *et al.* 1986). Nickerson, Perkins and Smith (1985) provide reviews of these and similar interventions.

The essential problem here, of course, is one of transfer. While there is evidence that these and others enhance the recipients' cognitive functioning, there is little documentation which demonstrates that improved subject performance results. In essence, whether a general thinking skills intervention will improve the ability of the subject to solve a particular problem in mathematics or understand a specific concept in physics, remains doubtful (Perkins & Salomon 1987). Or in the words of this discussion, there seems to be little evidence that it will enhance the learners' accessibility to particular disciplines.

Domain-dependent: Infusion approach

The weight of opinion at present is that teaching thinking as part of subject-matter instruction is both the most effective and the most efficient way of doing it. Glaser (1984), for example, argues that cognitive processes can most readily be learned as subject specific knowledge is being acquired. While there is considerable overlap, it is possible to give two broad categories here.

1. **The imposition model**

The growth of the recent emphasis on thinking skills has come about because of a growing disillusionment with the quality of the thinking which students display after completing traditional education. They arrive at universities with poor problem-solving and analytical skills. This has led to a concerted search for a means whereby content instruction can, at the same time, enhance thinking. The weight of attention has tended to be on the thinking skills rather than on the content. This is not to imply that content acquisition has been neglected. Far from it! But the emphasis has tended to be on the thinking skills. An example of this is Perkins' "Knowledge As Design" (1986), a powerful instructional heuristic which addresses very effectively the problem of inert knowledge.

This approach to infusion is an imposition of the thinking skills onto existing curricula so that the skill being developed (for example, critical or creative thinking, etc.) is developed out of a consideration of the content under discussion. In one sense the content does not really matter - history is as suitable as accounting. For this reason it may be called an "imposition approach". In the light of the discussion above, it is not immediately clear whether content acquisition can be regarded as a given result of this approach. Few studies have been reported which indicate that more meaningful content acquisition has taken place.

2. **The cognitive demand model**

In contrast to the Imposition Model, another approach emphasizes the cognitive operations within the content itself as being of primary importance. This approach therefore centres on the acquisition of the content by the learner by virtue of an understanding of the thinking skills intrinsic to the content itself. Additionally, a match needs to be established between what is to be learned and the learner.

This approach has been adopted by Shayer and Adey (1981) with the analyses being done in Piagetian terms. Indeed not much has been done in this area outside of the Piagetian perspective. Much of what has been done tends to focus on heuristics for problem-solving especially in mathematics (Schoenfeld 1985). As Reif (1986:3) notes about a large body of research done in physics education:

> However, with a few exceptions ... most of this work is descriptive rather than analytical. Thus it yields relatively few theoretical insights into the underlying thought processes accounting for the observed results.

The "Architectural Model" advocated by this paper has its roots in the Cognitive Demand Model. Indeed, significant improvements in the results of disadvantaged students in physics at the University of the Western Cape have been achieved after instruction based on an analysis of content for cognitive demand (Mehl 1990 In press).

DEVELOPING AN ARCHITECTURAL MODEL FOR ENHANCING ACCESS

Any discussion of expertise clearly illustrates that an expert has built up an extensive edifice of knowledge of a domain which can be accessed in large or small chunks depending on the circumstances. The content consists of concepts, laws, equations etc., connections between such, problem-solving abilities, a lack of misconceptions, the ability to reflect on the area and whatever else is needed which demonstrates understanding of the field [see Perkins and Simmons (1988) for a wide-ranging discussion of what constitutes both expertise and understanding].

From the discussion in previous sections it is clear that to acquire a level of expertise, the learner utilizes a large number of cognitive operations which are EMBEDDED in the content. These vary according to the demands of a particular area. Sometimes there will be overlap as has been illustrated by Newton's First Law and the problem in kinematics - both involve, for example, the extraction of implicit data. Frequently the need to visualize and/or to relate two sources of information are required. The list of cognitive operations is long, understandably. This obvious difficulty is taken up below.

What is proposed here is an Architectural Model for enhancing access, with the following features:

1. An edifice of knowledge already exists which each learner needs to construct in his/her own mind. The architects of the past have already designed the building - the newcomer needs to know how to put it together.

2. The concepts, laws, principles, equations etc. which constitute understanding when properly sequenced and linked are analogous to the bricks, sand, mortar, stone, glass, wood, etc. of the building.

3. The cognitive operations demanded by the content form the framework of the building. Without it no structure is possible in the form designed by the architects. The framework is well hidden when the building is completed. Its invisibility makes it difficult to extrapolate from completed structure. Acquisition of the content (construction of the edifice) means that the framework (cognitive operations demanded) must be disembedded. Indeed, construction without it being clearly visible, would be fruitless.

4. The scaffolding makes it possible to link the various elements to the framework. An imposed thinking skill such as knowledge as design, would qualify as a suitable mental scaffolding within which the other features can take place.

5. Frameworks for different parts of a building may be identical, similar or different as the case may be. The same would be true for different buildings altogether. The ability to use the same framework and to adjust it to suit the new situation, or to construct a new one on the basis of experience gained, would all constitute transfer in the best possible sense.

EXAMINING THE PARTICULARS

On frameworks

What are called frameworks in this paper, can be identified with what Perkins (1987) calls "Thinking Frames". The essential point of the present consideration relates to the nature of the frameworks as being inextricably bound up within the content and as representing a sine qua non for content acquisition.

Much more research needs to be done on the identification of these frameworks. As noted above, the number of cognitive operations is great. The work of Feuerstein (1980) in identifying "deficient cognitive operations" and Sternberg (1985) in the componential side of intelligence in his triarchic model, provides a useful cognitive template for the determination of parts of the framework.

In practice and on transfer

Some steps to accomplish access to a body of knowledge would include:

1. Analyse the section of content under discussion for cognitive operations demand. This may be done by examining available lists (Feuerstein, Sternberg, etc.), by generating one's own or conducting person-to-person interviews with students as they work through the area.

2. If a cognitive scaffolding is being used (e.g. knowledge as design), set it up.

3. Construct the learning experience for the student (whether lecture, printed material, peer group learning, etc.) with the required cognitive operations made explicit both for the learner to identify and to practice where possible.

4. The necessary links and connections of the content to the framework need to be made.

5. To ensure that thinking is enhanced

   - the process of disembedding cognitive operations needs to be taught in a specific context;

   - the process must be repeated for different sections in an attempt to make it automatic;

   - the replicability of the process to other areas, related, and unrelated, must be stressed and demonstrated;

   - reflection on the process must be emphasized.

In other words, effort needs to be made to enable learners to think within a context by using required cognitive operations, to transfer the process to different contexts, and to think about how and what they are thinking (the metacognitive process). This procedure would qualify as encouraging both low and high road transfer (Perkins & Salomon 1988).

CONCLUSION

While the approach may appear to be time consuming, it is worth remembering that many people in general, and disadvantaged persons in particular, learn with difficulty and often many times not at all. Accessibility can only be enhanced, with its associated power for social transformation if those factors mitigating against it (and which are within our powers to address as instructors) are carefully considered.

REFERENCES

ADEY, P. 1988. Cognitive acceleration: Review and prospects. International Journal of Science Education, *10*(2):121-134.

DE BONO, E. 1975. CoRT thinking. Blandford, Dorset, England: Direct Education Services Ltd.

FEUERSTEIN, R., RAND, Y., HOFFMAN, M. & MILLER, R. 1980. Instrumental Enrichment. Baltimore: University Park Press.

GLASER, R. 1984. The Role of Knowledge. American Psychologist, 39:93-104.

HERNNSTEIN, R.J., NICKERSON, R.S., SANCHEZ, M. & SWETS, J.A. 1986. Teaching Thinking Skills. American Psychologist, 41:1279-1289.

HOFMEYR, J., & SPENCE, R. 1989. Bridges To The Future. Optima, *37*(1):37-47.

MEHL, M. 1985. The Cognitive Difficulties of Disadvantaged Students at the University of the Western Cape and Various Compensatory Programmes. Unpublished Doctoral Dissertation. University of Cape Town.

MEHL, M. In press. Developing procedures for understanding first year mechanics. South African Journal of Science.

MOULDER, J. 1989. How Universities Can Survive. Argus, 7 August:11.

NICKERSON, R., PERKINS, D. & SMITH, E. 1985. The Teaching of Thinking. Hillsdale, NJ: Erlbaum.

PERKINS, D. 1987. Thinking Frames: An Integrative Perspective on Teaching Cognitive Skills. In Baron, J. & Sternberg, R. (eds.) Teaching Thinking Skills: Theory and Practice. New York: Freeman.

PERKINS, D.N. 1986. Knowledge As Design. Hillsdale, NJ: Erlbaum.

PERKINS, D.N. & SIMMONS, R. 1988. The Cognitive Roots of Scientific and Mathematical Ability. Conference on Academic Talent in Sciences, Mathematics and Technology. Duke University (March 28-30).

PERKINS, D.N. & SALOMON, G. 1988. Teaching For Transfer. Educational Leadership, September: 22-32.

PERKINS, D.N. & SALOMON, G. 1987. Transfer and Teaching Thinking. In Perkins, D.N., Lochhead, J. & Bishop, J. (eds.) Thinking: The Second International Conference. Hillsdale, NJ: Erlbaum.

REIF, F. 1986. Interpretation of Scientific or Mathematical Concepts: Cognitive Issues and Instructional Implications. Department of Physics and School of Education, University of California, Berkeley.

RESNICK, L. 1987. Education and Learning to Think. Washington, DC: National Academy Press.

SCHOENFELD, A. 1985. Mathematical problem-solving. New York: Academic Press.

SHAYER, M. & ADEY, P. 1981. Towards a Science of Science Teaching. London: Heinemann Educational Books.

STERNBERG, R.J. 1985. Beyond I.Q.: A triarchic theory of human intelligence. New York: Cambridge University Press.

THE STUDY OF CHANGE

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INTRODUCTION

People everywhere, including people in this tortured land, will develop and will develop cognitively. In addition, all people, because they are people, are heirs to the same potential for thinking, knowing and doing. "Cognitive development in the Southern African context" must, therefore, refer to something other than that which we can take for granted about all people, through all time and space. I will assume, therefore, that our concern or interest centres around the conflicting sociohistorical, and individual-developmental products of being, learning, and becoming in the Southern African context.

To make some general points about the study of cognition, I will use my work with black African students who were admitted to university through an alternative assessment procedure, to that of the matric point system. What these students know and can do, and the degree to which this knowledge and these operations are inadequate or inappropriate for university tasks, seems an important focus in the study of cognitive development: Their goal-directed activities, as is the case with any adult learner, embody the products of their learning, being and becoming in the contexts of their lives, from birth onwards. Moreover, in attempting to intervene in the learning-teaching of those who have been denied adequate access to appropriate learning opportunities, we cannot afford to ignore this present population of adult learners in favour of those who are experiencing the early years of cognitive development, where intervention is relatively easier. I am suggesting, therefore, that a focus on adult learners is not only theoretically interesting for the study of cognition, in general, but also practically necessary in the Southern African context.

I will discuss the following points with regard to cognitive development:

- The universal (human) capacities for language, thought and problem-solving find particular expressions which are space and time dependent.
- Individual-social development (over time and space) produces problem-solving situations which essentially define and constrain that development and the tasks which are part of it.
- Knowing is tranformative; the being which acts and the tasks acted upon are transformed through this transaction, and this constitutes the continuous spiral of individual-social development.

With regard to the study of cognition, my focus is on the following issues:

- The question, "How do we come to know...(whatever aspect of life) ?" is the driving force behind the study of cognition.

- The study of cognition as the changing study of a changing object of knowledge.

- The transaction between the knower, the known and ways of knowing demands theories, models and methods which will embody and express both the manifest and underlying content and form of how we come to know. This holds for both the practice of social science and education when conflicting paradigms meet.

WORK WITH ADULT LEARNERS

The work I will refer to was started in 1986 and has been continuous since then (Craig 1987; 1988; 1989; in press). The most basic aim of this work is to establish theoretical and practical bases for educational development in the case of students who are regarded as "underprepared" for university studies. At a first glance, this notion must refer to people who are competent and clever and otherwise intact but who display knowledge and (problem-solving) operations which are inadequate or inappropriate for the tasks they confront. Furthermore, it implies that the tasks have essential, socio-historical, natures[1] which place constraints on those who engage in them, and that these demands and limits are not, for whatever reasons, appreciated or accepted by those labelled as "underprepared". I attempt to capture these two aspects of task engagement - the knowledge and operations of the learner and, the nature of the task - in the notion, "cognitive and epistemological constraints on task engagement". Furthermore, the term "underprepared", and all the other terms which are, somehow, meant to focus our attention on conflicting or differing products of being, learning, and becoming in a particular context, must address (at least) the following questions, if they are to be more than labels for black students entering traditionally white places of education or, labels for those who fail to meet the set standards of adequacy or excellence in education:

- How do we come to know whether people are competent and clever and otherwise intact?

- How do we come to know the essential, socio-historical, natures of tasks?

- How do we come to know which knowledge and (problem-solving) operations are adequate or appropriate for the tasks encountered in praxis?

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[1] "Natures" is an uncomfortable word but I want to capture the changing nature of any task within a particular tradition, as well as the fact of different paradigms for action or task engagement which, in effect, change the nature of the task as acted upon from the vantage point of different individual-social developmental trajectories. These natures "slip and slide" over and under the focal point(s) of action - the task-in-action or, the action-in-task - in a manner which engages the actor in a particular way as the actions define the task in a particular way. From an ideal perspective, task analysis does, however, reveal an essential nature to a task which places demands on the actor regarding the terms in which it needs to be engaged in if task mastery is to be judged in terms consistent with the individual-social development trajectory of which the task is an integral part.

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It is in formulating the framework(s) - methods, theories and models - for coming to know about these three interrelated issues that we begin to unravel a notion such as "underpreparedness" and also begin to develop the (theoretical and practical) tools for the study of change and for intervening in a changing individual-social reality. Moreover, the question, "How do we come to know...(whatever aspect of life)?", is the central force giving the discipline of cognition its content and form.

THE STUDY OF COGNITION

Knowing is transformative. The actions that a researcher performs when deliberately studying some aspect of life, and the actions that a learner performs in coming to know, continuously transform the knower, ways of knowing, and the task. Coming to know about knowing is, therefore, the changing study of a changing object of knowledge; hence the title of my paper. That the tasks facing the researcher and the student-learner may be very different in some ways, does not diminish the central issue in the study of cognitive development, namely that the tools we use to study an object of knowledge transform the object as they themselves are transformed, and that the tool user is not exempt from this process of change. We have Piaget to thank for underscoring this central issue, and Vygotsky for the insights, that the products of our investigations are inseparable from the tools we use, and that a crucial task for researchers entails the search for "a single living cell" within which to discover "the structure of the entire system" (1978:8). I focus on the learning-teaching dialectic at university as such a "cell". [See Vygotsky's "theory-method" (1978:8); Catan's (1986) elaboration of this; and Craig (1988b; 1990), and Miller (1984; 1987) for further applications of this to the study of cognition in the Southern African context.]

It is in the study of adult cognition in particular that "self" and "other", as objects of knowledge, is most intricately fused. That we adopt specifiable methods, theories and models for research, which are in an important sense the framework(s) we spell out for and of our own (and others') process of coming to know, has its analogy in the learning-teaching process. When the focus is on underprepared learners they too have to be equipped with appropriate methods (e.g. metacognitive strategies), theories (e.g. about different kinds of problem-solving situations and their demands) and models (e.g. for the process of analysis). More importantly, those who do research into cognition are constrained by a similar process constraining any other actor confronted with a task / problem which begs resolution. This process moves across moments in a spiral of knowing which is then exploded into not-knowing, and this again is transformed into knowing, etc. [See Piaget (1972) on the process of equilibration.] This spiral, which encloses the transaction between the knower, the known, and ways of knowing, is the (changing) object of knowledge when one cognizer studies the cognition of an other. This object of knowledge, that is, the framework enclosing the knower, the known and ways of knowing as well as actions (of self and other) directed at coming to know, and their products, demands methods, theories and models which will contain and disclose the transformative power of action.

This model of the theory-method adopted for the study of cognition, embodies the following tenets:

- The study of cognition demands a focus on the praxis of self and other.

- Data production and analysis occur through different horizontal levels or orders.

- The meaning assigned to data occurs within the constraints of different vertical horizons of meaning or theory-methods or paradigms for understanding and explaining action.

- The directionality of empirical research is not determined. The horizontal moves could occur from the top down (e.g. when validating an existing theory) or from the bottom up (e.g. when constructing a theory), and the explanation and understanding of praxis could occur from left to right or in the opposite direction - from the perspective of the theory-method of the other, or the self.

- This process is not horizontally or vertically closed and demands the ongoing resolution of the paradoxes which result from this horizontal and vertical constitution of different levels and moments in data production and analysis.

These tenets, levels and moments for and in analysis seem crucial for the study of change [see Craig (1985; 1989b; 1990)].

ADAPTATION AND CHANGE

In my work with underprepared learners, I attempt to equip them with that knowledge and those operations which will allow them to adapt to the demands of university tasks as they are, and also as these may become. In other words, the emphasis is, firstly, on what they need to know and do in order to engage effectively and autonomously in university tasks, and secondly, on equipping them with that knowledge and those operations which will enable them to confront novel and perhaps even truly novel tasks. Towards this aim I use Strohm Kitchener's (1983) three-level model of cognitive processing, adapted to the adult learning-teaching situation.

Research that I have conducted has revealed that underprepared students use the following epistemic cognition (Strohm Kitchener 1983:226), or theories and models for task engagement:

1. There is "right" and "true" and "proper", because God (or the Bible or some other unquestionable authority made it so, or because Nature constitutes it as such (and in no other way).

2. The "I" of being or living or daily interaction has only one direct route of access to this "true" and "right" and "proper", and that is through personal, immediate first person accounts of experience.

3. If the experience of "I" has any revelation about (or conversion to) the "truth", etc., then that revelation has (of necessity) a linear (narrative) line which shows that the events which are presented - sequentially - produce the last event as the obvious "truth", etc.

4. The revealed "truth", etc. (or last event) begs no resolution of paradoxes (horizontally or vertically) or an appreciation that this claim may beg evidence, or an appreciation of the logical, epistemic and moral consequences following on from it (see Craig 1990 in press).

Strohm Kitchener (1983) writes the following about epistemic cognition: it "leads one to intepret the nature of a problem and to define the limits of any strategy to solving it" (p. 226). In this regard, underprepared students will confront "ill-structured problems" (p. 224) in a manner which is not suitable for their resolution. Ill-structured problems are the general case of those problems in life, learning and science, for which we construct a solution "by integrating or synthesizing diverse data and opinion. (Where the) processes involved are not mechanical or reducible to an algorithm. (And where they) include making judgements about arguments and evidence on what may be opposing sides of an issue..., evaluating information from inconsistent and imperfect data sources..., and developing and arguing for a reasonable solution..." (p. 225). She goes on to define a reasonable solution as "the one which creates the best fit with our current knowledge of the issue..., or that redefines a problem in such a way that opposing perspectives are synthesized into a new framework" (*ibid.*). When "our" current knowledge of an issue is in conflict with "their" knowledge, this demands at least that we make not only what we know but also how this knowledge came about, explicit to those from another learning history. And, through the ongoing analysis and engagement in the transaction between the knower, the known, and ways of knowing, the often referred to crisis in education, may allow for the redefinition of that which all participants have come to take for granted.

The epistemic assumptions upheld by underprepared students also suggests that the notion "underprepared" does not primarily mean people <u>without</u> knowledge and skills. We are not, therefore, dealing with "an empty head syndrome" but rather with conflicting paradigms for action. This, of course, makes the learning-teaching dialectic much more complex as "unlearning" is more difficult for both learner and teacher than merely learning new knowledge and new operations.

In terms of <u>metacognition</u>, underprepared students are typically unable to regulate their own task engagement according to those criteria demanded by the nature of university tasks. Given their epistemic assumptions, they tend to monitor their task engagement as follows:

-- Have I located and am I presenting the "truth" of the matter in as much (factual) detail as is necessary?

This judgement is often made on a very incomplete picture of "our current knowledge of the issue", as well as with an almost total lack of appreciation of the demands of the ill-structured problems they address in Arts and Social Science studies at university level.

Absent from their metacognitive control over their task engagement is a familiarity with the rules and criteria which are essentially part, and the result of, textual analysis, the resolution of ill-structured or open-ended problems, the nature of theoretical discourse, and the logic and form of the (critical) argument [see Craig (1989; in press)].

The assumption is, and this has to a large degree been vindicated through the Teach-Test-Teach programme at the University of Natal [see Craig & Griesel (1989)] - that when students are equipped with the necessary meta- and epistemic cognition, that they are not only empowered with that which makes task mastery possible but also with the necessary tools for dealing with unfamiliar tasks. This seems to suggest something interesting about cognitive development. The apparent match or fit between individual actor and task (when the paradigm within which the task is located is the same as that which is used by the actor for problem-solving), forms part of an intricate network of social and individual development where the nature of a task and what the actor can and will do when engaging in it serve to instantiate each other. Through "socialization" people are equipped with the necessary knowledge and operations to engage in those tasks which form part of their being and history, and to the degree that this process and its products are silent or tacit, we call this development. When there is a misfit between the paradigm within which the task is located, and the paradigm used by the actor for problem-solving, what has not developed must become the explicit task in the learning-teaching situation. When the focus of learning is on that which has not yet developed, that which is learned will become part of the actor's habitual repertoire for goal-directed activities, and so, part of his/her development. This explicit project we call education, and education at its most successful transforms what is known and ways of knowing for those engaged in this human enterprise.

Adaptation to tasks they are as may, therefore, be regarded as a first step towards change; change in the sense of the transformative power of action where acting appropriately changes the knower, knowing and the task. That action has this transformative power is not different when studying the cognitive development of children or adults. An obvious difference in the case of the learning-teaching of underprepared adults is that meta- and epistemic cognition can and should be made explicit and deliberately taught, whereas in the case of children the open and implicit project of socialization equips them, over time and maturation, with the necessary pre-understanding and understanding for familiar

tasks. It is in this difference between what must be taught and what develops that we begin to confront an answer to the often repeated counter to the kind of work I refer to, namely: "But not even my Honours students know about this meta- and epistemic stuff!" When there is a conflict between different learning histories, as is the case in the different and conflicting paradigms for action contained in Eurocentric (university) tasks, and upheld by African learners who have, in addition, been denied equal access to sociopolitical, economic and educational opportunities, that conflict begs explication and deliberate learning-teaching if it is to be resolved by underprepared learners. This conflict between actors and tasks, hidden in the stagnating system of apartheid, which prevented adaptation and change or the transformation of tasks by people or people by tasks - through keeping difference separate - now becomes the occasion for unravelling what "education" and cognitive development means or essentially entails. Phrased differently, when social-history and individual-development do not contain that which is necessary to compete effectively with others, the essence of the learning-teaching dialectic comes to the fore: Education's most basic task seems exactly to learn and teach that which has not already developed. To fulfil this basic task within the constraints of a particular setting, we need to consider the following questions:

1. How do we come to know whether people are competent and clever and otherwise intact?

We know, both from ordinary life and social science, that people who are different from "us" are competent, clever and otherwise intact when he/she - as a learner - can learn and make that (content and contentless) learning part of his/her habitual repertoire for action, with some speed and efficiency. This is also the case when people with different paradigms for action meet in "open" sites of learning, work and play, except that psychologists (with, of course, a few notable exceptions) have seemingly forgotten this. On the whole, if psychology did anything it created enough tests to make the world stand still! Stand still because for most, if not all, of these tests to mean anything at all we need a stable universe before and after testing. In a situation where we are set on creating a very different learning environment for especially black African learners than that to which they have been exposed, the usual psychometric and edumetric tests for assessing cognitive development are just not good enough, and their use is actually unethical. In this regard, those who want to or must intervene in the products of a specific learning history must delve much deeper than the surface of either "their" or "our" products of learning, being and becoming. When teaching "them", "our" tricks [see Miller (1984); Craig (1985)], and when assessing this process, we have to make sure that what we teach and assess are not only the "fossils" of long periods of social-individual development, but also that which underlies that knowledge (Vygotsky 1978:63). Intervening in the individual-developmental and sociohistorical products of another is, therefore, not only fraught with political potholes but also much more demanding than merely perpetuating that which is taken for granted. In a very important sense, working with underprepared, black African students has restored my faith in the larger project of any or all education. When the

moves between life's stages and tasks are smooth enough to warrant easy and silent transition from one to another, education very soon becomes a word for, "never being surprised enough about life, self and other to be changed or to change".

2. How do we come to know the essential, socio-historical, natures of tasks?

As my work with underprepared students has restored my faith in the project of education, it has compelled me to move "the knower" back for epistemology, and epistemology for "the knower", a project which has lost favour and substance in the last few decades. This is so because in attempting to unravel the essential, sociohistorical natures of tasks, I have had to be informed by that body of knowledge variously labelled, "the sociology of knowledge", "the philosophy of science and social science", "epistemology", "the history of ideas", etc. If I am correct in proposing that we have to make sure that what we teach and assess are not only the "fossils" of long periods of social-individual development, but also that which underlies that knowledge, then educators have to be informed by those (epistemological) constraints on tasks which lie deeper than the face of what is known and done habitually by "us". An instruction like, "Write a critical commentary on.....(whatever topic)", for example, may be radically obscure to someone who is competent, clever and otherwise intact but who comes from a different learning history than that which makes this task self-evident.

Once again we must realize, deeply, that we are dealing with shifting faces of reality, so the tasks to be analysed will change through analysis. This change will demand further analysis of the (now) changed task, etc., so that coming to know the essential, sociohistorical natures of tasks demands not only being informed by the history and philosphy of ideas and the reverberation of these through societies, but also ongoing analysis of self's and other's task engagement, and the task. This process must surely make what we take for granted as knowledge much richer and more dynamic and, perhaps of more immediate concern, much more accessible to those who are underprepared for university studies as they are, and as these may become.

3. How do we come to know which knowledge and (problem-solving) operations are adequate or appropriate for the tasks encountered in praxis?

On the most concrete level, knowledge and operations are appropriate for a task when a learner can spontaneously use these with speed and efficiency so that he/she meets set standards of adequacy and/or excellence. But, because action during problem-solving conceals the (implicit or explicit) knowledge and operations applied, the researcher cannot use performance, unmediated by an appropriate theory-method, as data from which to derive that knowledge and those operations which are appropriate for the tasks encountered in praxis. Phrased differently, successful performance may

conceal inadequate or erroneous models, theories and methods, and vice versa. This poses one of the more difficult problems regarding the study of cognition. In this regard, and as stated before, Vygotsky's theory-method and its embodiment in Piaget's work [see Miller (1984)], provides an as yet unequalled methodology for the study of change. It is from this basis that the model in Figure 1 has been developed over successive empirical projects. Through the horizontal levels indicated, the researcher constructs the cognitive and epistemological constraints on praxis for both self and other, and derives the possible moments in learning-teaching which will allow for change from the familiar to the unfamiliar. Through the vertical moves, this construction and the formulation of possible moments for change is informed by the essential, sociohistorical natures of tasks, and the process of coming to know, from the vantage points of both self and other. The cognitive and epistemological constraints, the possible moments in learning, and goal-directed action, together constitute the "functional-structure" of the task (for any cognizer, both researcher and the researched). Functional-structure in the sense that it is only when the structure of the engagement is exposed, through action, that the task functions as a task (with its horizon of meaning) vis-à-vis the actor (as a cognizer, with his/her own horizon of meaning). These constraints and possible moments are used as focal points in mediating the content and contentless demands of tasks, in order to open these for investigation aimed at instantiating the constraints, the moments, and process of unravelling the confrontation between knower, task, and ways of knowing. The empirical focus is, therefore, on cycles of praxis, while the theoretical focus is on that which is generated (i.e. the "texts" of self and other, see Figure 1), and that which generates adaptation or change.

CONCLUSION

"...(T)wo stones thrown into a pond make ripples which meet and, at the point of meeting, something new happens - something that is based on the individual forms that preceded it, but is nevertheless different" (Hutcheon 1989:118).

The seeming conflict between what some black African learners bring to the learning-teaching situation in terms of knowledge and operations, and what university tasks in general demand, seems best understood as conflicting paradigms for action. I do not believe that the tension between the products of one learning history, and the products of another is a sorry state of affairs. In fact, I have some empirical basis for the idea that, whenever we touch this live-wire with theoretical and practical care, we not only transcend the congealed rubbish by which we come to know self and other in this land, in particular, but we also create a basis for individual and social change. The so-called crisis in education is only a crisis if we fail to provide the resources to surmount that conflict which is necessary for change [see Piaget (1977); Craig (1987)].

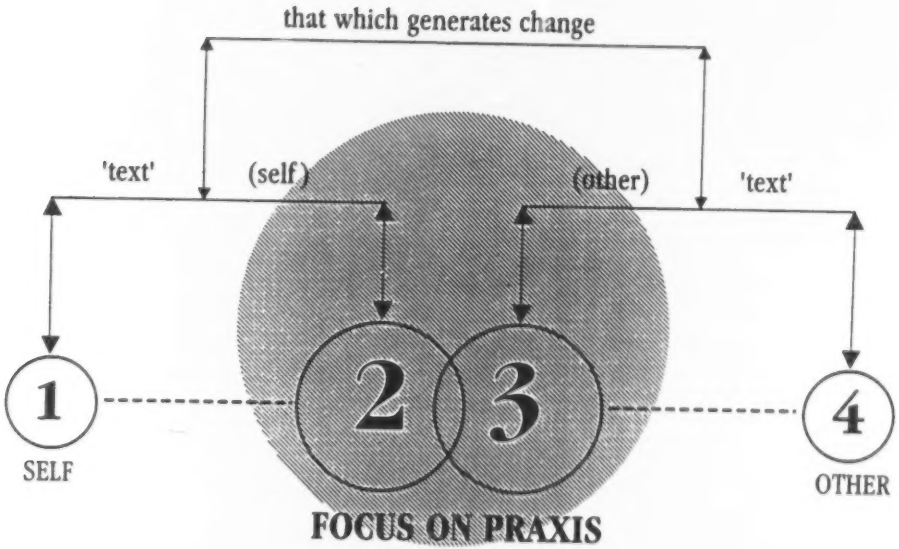

FIGURE 1: A FRAMEWORK FOR THE STUDY OF CHANGE

In my study of cognitive development in the Southern African context, I have come to rediscover, what great minds before me no doubt knew long ago, and that is:

- that the link between the knower, the known, and ways of knowing is central to the study of cognition;

- that the study of change is an important focus in the development of those theories, models, and methods we use to explain and understand the human condition;

- that ongoing task analysis is crucial if we want to or must intervene in the conflict between different individual-developmental and sociohistorical products; and

- that mediation at its most successful equips learners not only with that knowledge and those operations needed for tasks as they are, but also with what may be needed in those tasks which are as yet unknown.

REFERENCES

CATAN, L. 1986. The dynamic display of process: Historical development and contemporary uses of the microgenetic method. Human Development, 29:252-263.

CRAIG, A.P. 1985. Mothers and children: The study of change. Unpublished doctoral dissertation. University of Natal, Durban.

CRAIG, A.P. 1987. A cognitive infrastructure for change in Southern Africa. Theoria, LXX: 77-84.

CRAIG, A.P. 1988a. Excellence in and through education. South African Journal of Higher Education, 2:3-8.

CRAIG, A.P. 1988b. On the method of analysing human transaction recorded on videotape. South African Journal of Psychology, 18:96-103.

CRAIG, A.P. 1989. The conflict between the familiar and the unfamiliar. South African Journal of Education, 3:166-172.

CRAIG, A.P. 1990. The project of social science and the activities of psychologists. South African Journal of Psychology, 20:10-19.

CRAIG, A.P. In press. Adult cognition and tertiary studies. South African Journal of Higher Education.

CRAIG, A.P. & GRIESEL, H. September, 1989. Pilot phase of the Teach-test-teach Research and Educational Development Programme at the University of Natal. Unpublished research report. University of Natal, Durban.

HUTCHEON, L. 1989. The Politics of Postmodernism. London: Routledge.

MILLER, R. 1984. Reflections of [illegible] and Culture. Inaugural lecture. Pietermaritzburg: University of Natal Press.

MILLER, R. 1987. A focus for change. In Mauer, K.F. & Retief, A.I. (eds.) Psychology in Context: Cross Cultural Research Trends in South Africa. Pretoria: HSRC.

PIAGET, J. 1977. The Development of Thought. Oxford: Basil Blackwell.

STROHM KITCHENER, K. 1983. Cognition, metacognition, and epistemic cognition. A three-level model of cognitive processing. Human Development, 26:222-232.

VYGOTSKY, L. 1978. Mind in Society. Cambridge, Massachusetts: Harvard University Press.

ECOCULTURAL VARIABLES AND THE SOCIOCOGNITIVE MILIEU OF BLACK SOUTH AFRICAN CHILDREN IN THE YEAR BEFORE SCHOOL*

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INTRODUCTION

One of the underlying assumptions of cross-cultural psychology is that "cultures" represent homogenous and, at least to some extent, distinct units that can be meaningfully compared. However, this assumption has been challenged at a number of levels in recent years (e.g. Cowlishaw 1986; Weisner 1985).

For example, one of the primary concepts used to discriminate between cultural groups is ethnicity. However, Burdette (1988) reports that Zambians distinguish themselves on the basis of region rather than ethnicity. Similarly, Cowlishaw (1986) and Keefe (1988) question the degree to which Aborigines who have lived in urban areas for many years can be meaningfully defined as Aboriginal rather than as urban-Australian.

In the South African context, Sharp (1980) questions the degree to which ethnicity persists as a meaningful discriminatory construct, a caution also voiced by Felgate (1982). In the latter study, Felgate reports on the degree to which different communities of traditional Thonga from northern Natal varied from one another, depending on factors such as local ecology, subsistence modes, and patterns of social organization. Nevertheless, Liddell (1988) reported that children from two distinct ethnic groups of San living in the same military base were significantly different across a range of social and activity categories.

Within individual cultures, rural versus urban markers are commonly used to make distinctions between groups. Here too, some debate exists regarding construct validity (Graves 1982; Weisner 1985). In the South African context, Reynolds (1989) reports that the rural/urban division has given way to a division based on socioeconomic status, particularly in terms of differences in family life, household organization, and child behaviour.

The assumptions that cultural divisions can be made on the basis of concepts such as ethnicity or degree of urbanization are important ones for empirical examination. To the extent that cross-cultural investigators compare groups according to such fixed and relatively clear-cut constructs, difficulties may be encountered when studying groups that are undergoing rapid change along a number of dimensions simultaneously. In many instances, cultural transformations are constituted by a number of concurrent changes e.g. migrations across rural/urban and geographic boundaries, combined with intermarriage to other cultural groups and changes in subsistence mode, etc. Without a simultaneous investigation of a number of different dimensions of change, it remains difficult to isolate the most salient aspects of culture, and cross-cultural psychology runs the risk of focusing on inappropriate or simplistic constructs that may have limited predictive power.

In this context, the problem is not merely of academic relevance to cross-cultural inquiry. If cultural groups are being distinguished along simplistic dimensions of limited validity, then the discipline may be misrepresenting the communities it seeks to promote an understanding of, and may be failing to grapple with the complexity and richness of cultural transformation (Keefe 1988; Schwendler 1984).

The present paper attempts to examine four different aspects of ecocultural difference simultaneously, in an attempt to understand which aspect is most relevant. It focuses on four groups of children from different black South African communities. These four groups can be distinguished in the following ways. First, ethnicity - defined in terms of the two linguistic groups from which children were drawn. Second, degree of urbanization - with two of the groups living in deep rural areas, and two being second-generation urban. Third, geographic region, with two groups living in the province of Natal and two in the province of the Transvaal; the children in Natal lived at least 600 kilometres apart from those in the Transvaal and the regions were climatically different. Finally, the four groups could be construed as each unique, i.e. not specifically definable in terms of linguistic, urban/rural, or geographic features. The paper compares the degree to which these four constructs predict children's patterns of everyday social interaction and language use, activity, and object use in the year before school.

However, the broader aim of the paper lies in evaluating a multifactor predictive model of the children's behaviour, with the selected ecocultural variable comprising only one source of variance. The choice of additional variables was based on research - both non-Western and Western - which had attempted to isolate aspects of children's home experience that were associated with behaviour and/or developmental status. The variables selected were as follows.

Socioeconomic status was included on the grounds that it is considered by many developmental psychologists to be one of the overarching factors predicting child outcome variables such as school performance (Edelstein 1981; Tizard *et al.* 1988), social competence (Rubin, Maioni & Hornung 1976), and language use (Brice-Heath 1988). On this basis, a measure of socioeconomic status was derived from the children's biographical data and inserted into the model.

Household size was included because it has been reported as a consistent factor in predicting children's performance in South African (Richter 1989), other African (Durojaiye 1982; Whiting & Edwards 1979), and Western communities (Bryant 1985; Osborn & Milbank 1987). Household size therefore comprised an additional variable for insertion into the model.

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Finally, the degree to which families rely on subsistence agriculture was included in the model, since it has been reported as salient for children's everyday patterns of behaviour in non-Western samples (Berry 1976; Weisner 1985). The children studied here varied considerably in terms of the degree to which their households relied on food from the land.

The aim, therefore, was to construct a predictive model based on the single-most appropriate of four different ecocultural constructs, used in conjunction with other variables that are thought to be important in determining children's behaviour. The degree to which such a model is able to explain variance among children could then be critically examined.

Studies in which ecocultural factors and physical or household context are co-examined in a predictive model are reasonably common (e.g. Bradley & Caldwell 1984), although not for non-Western children. In addition, the present study is one of few attempts to extract the most relevant cultural variable for insertion before such a model is tested.

METHOD

SAMPLE AND SUBGROUPS

The sample consisted of 80 children, averaging 62,6 months old (S.D. 4,14). Twenty children (10 boys, 10 girls) each lived in each of four different areas, namely Mamelodi, Umlazi, Nebo, Nqabeni. Details of the distribution of children according to the four different dimensions of ecocultural difference are contained in Table 1. As indicated, the groups could be distinguished according to four different criteria, namely four different places, two levels of urbanization, two different geographic regions, and two ethnic/linguistic groups.

Mamelodi and Umlazi children were at least second-generation urban; Nebo and Nqabeni children were at least second-generation rural. In terms of ethnicity, Sotho and Nguni represent the two major ethnic groupings in South Africa, and are linguistically distinct (Alexander 1989).

Table 1: Subgroups according to the four different cultural criteria

ECOCULTURAL CRITERIA			
UNIQUE PLACES	RURAL/URBAN	REGIONAL	ETHNIC
Mamelodi: (10 of each sex)	Urban:	Transvaal:	Nguni:
!Umlazi (10 of each sex)	Mamelodi + Umlazi (20 of each sex)	Mamelodi + Nebo (20 of each sex)	(27 boys + 25 girls)
Nebo (10 of each sex)	Rural:	Natal:	Sotho:
Nqabeni (10 of each sex)	Nebo + Nqabeni (20 of each sex)	Umlazi + Nqabeni (20 of each sex)	(13 boys + 15 girls)

Details of the four study sites

Mamelodi:

Mamelodi is a large urban township 15 kilometres outside the administrative capital of Pretoria. It is situated inland at high altitude and experiences hot wet summers, and cold dry winters. The township is serviced by a number of preschools, schools, clinics, shops, training colleges, and a satellite university campus. It is administered from municipal offices, headed by a town clerk and a mayor. Primary roads are tarred, and often four-laned, although roads between houses are often untarred and in bad repair.

Umlazi:

Umlazi township is situated 15 kilometres from the port city of Durban. It is situated at sea level and experiences hot humid summers and warm dry winters. It is serviced by preschools, schools, and technical colleges, as well as a satellite university campus. Main roads are tarred, but never more than two-laned, and roads between houses are generally untarred and in bad repair.

Nebo:

Nebo comprises a region of South Africa's second-largest homeland, Lebowa, and is situated in the north-eastern Transvaal. It experiences a similar climate to Mamelodi. The nearest city is 450 kilometres away, and the nearest small town 100 kilometres away. There is a two-lane tarred road running through the region, although all other roads are untarred. Lebowa is governed by a central chiefdom, which administers the homeland from municipal offices approximately 50 kilometres from our study site. The region is served by a few preschools, schools, and a central hospital. No tertiary education facilities are available in the region. Shops comprise small trading stores with limited supplies of staple food-stuffs, tinned foods, alcohol and tobacco.

Nqaberi:

Nqaberi comprises part of KwaZulu, a non-independent homeland of South Africa, and is situated in southern Natal. It experiences a similar climate to Umlazi. The nearest city is 180 kilometres away, and the nearest small town 70 kilometres away. There is no tarred road running through the region. The region is governed by a local chiefdom, run from the chief's home 16 kilometres from our study site. The region is served by a few preschools, schools, and a central hospital. No tertiary education facilities are available in the region. Shops comprise small trading stores with limited supplies of staple food-stuffs, tinned foods, alcohol and tobacco.

SAMPLING METHODS

Households were selected using a snowball sampling system, in which the observers would be driven by the authors to a particular spot (randomly chosen), and would then approach the first house for information on where the nearest child of around five years old lived. Thereafter, referrals continued until a child that fulfilled criteria for selection was found. The criteria for selection were: the children would be attending school in the following year; the children had no history of severe ill health or malnutrition and the children's fathers were employed away from home during the day. None of the children knew each other or played together.

DATA COLLECTION

Observational data

These were collected by the two research assistants during the period July 1988 to February 1990. Data were collected during daylight hours, as is customary in ethological or ethnographic studies (Bloch 1988; Fry 1988). The research assistants were fully familiar with the language and customs of the children observed. Primary caretakers were initially approached and the nature of the investigation was fully explained to them. Permission was requested to include their child in the study. No primary caretaker refused.

Thereafter children were habituated to the presence of a strange observer of durations ranging between four and eight hours. Habituation sessions each lasted two hours and took place over consecutive weekdays. Four children failed to habituate after eight hours, and were subsequently replaced. During habituation sessions, dummy data were gathered using exactly the same techniques as were used for data collection.

Following successful habituation, observations were made onto checksheets at 30-second intervals which were marked by a hand-held electronic bleeper. A scan interval sampling technique was used, since this has been found to reflect durations of behaviour accurately (Altmann 1974).

A total of 1440 30-second intervals of data (12 hours) were collected on each child (not including habituation sessions). The same observer collected all data on any one child.

Biographical data

Once all observational data had been collected on an individual child, a biographical questionnaire was completed for each household. Items pertaining to type of dwelling, number of books, toys, magazines in the home, water supply, and degree of reliance on subsistence economy, were completed by the observer independent of the primary caretaker, and were based on her 16-20 hours of observation of the household. Items pertaining to household size, levels of education in the family, age of primary caretaker, and relationship of primary caretaker to child (mother, grandmother, other) were completed with the assistance of the primary caretaker. Biographical data for all four study sites are contained in Table 2.

Most of the categories in Table 2 are self-explanatory with the exception of the socioeconomic score. Accurate assessments of socioeconomic status are extremely difficult to establish in lesser developed countries (Liddell & Kruger 1989; Fry 1988), and for a number of reasons. First, many workers are unskilled and may be forced to move in and out of casual jobs fairly rapidly. Second, extended households and kinship networks often provide substantial but sporadic financial support to families in need. Third, many families are unwilling to disclose the degree of their financial hardship, which - in the present study at least - was sometimes extreme.

Table 2: Biographical data for the four different samples studied - means (S.D.s - where appropriate)

URBAN/RURAL: PROVINCE: PLACE:	URBAN TRANSVAAL MAMELODI	URBAN NATAL UMLAZI	RURAL NATAL NQABENI	RURAL TRANSVAAL LEBOWA
HOUSEHOLD CHARACTERISTICS				
Dwellings				
Hut : shack : brick	5:0:95	5:0:95	90:0:10	55:15:30
Water source				
River : standpipe : indoor tap	0:55:45	0:0:100	100:0:0	65:35:0
Books				
0 : 1-2 : 3-10	45:30:25	0:60:40	60:40:0	26:63:11
Newspapers & Magazines				
0 : 1-2 : 3-10	47:41:12	7:47:47	55:40:5	85:15:0
Toys				
0 : 1-2 : 3-10	11:78:11	0:73:27	10:90:0	30:60:10
Reliance on subsistence				
Often : some : never	1:21:68	0:33:67	94:6:0	15:45:40
Average household size	8,11 (3,86)	8,45 (3,17)	8,94 (3,28)	5,15 (2,08)
Average n workers in household	1,94 (0,85)	0,95 (0,22)	1,31 (1,35)	1,00 (0,00)
Average highest education in household (yrs)	8,67 (2,66)	8,95 (1,93)	4,40 (2,04)	5,95 (3,14)
Average SES score	140,63 (41,24)	123,25 (26,39)	79,67 (32,60)	97,16 (39,61)
CHARACTERISTICS OF PRIMARY CARETAKER				
Relationship				
Mother : grand-mother : other	40:30:30	55:35:10	65:15:20	70:10:20
Caretaker age (yrs)	36,89 (15,14)	42,35 (15,30)	38,05 (17,06)	32,06 (12,84)
Caretaker education (yrs)	5,14 (3,82)	5,12 (3,48)	2,00 (2,00)	4,00 (3,71)

As a result of these difficulties, we endeavoured to obtain a composite score that was based on a number of measures that most caretakers (n = 69) were willing to provide information on. These were the following:

(a) highest education in household, expressed in years

(b) the ratio of workers to household size. Thus if a household of eight members had one person employed, the score here was 1/8 = 0,125. This ratio catered for the degree to which income would have to be spread around households of varying size.

(c) the highest level of employment in the family. Here, a score of 1 was assigned to households where the only form of income came from pensions or sale of agricultural goods during good seasons; a score of 2 was assigned to unskilled manual labourers; 3 was assigned to people employed as semiskilled office workers or building foremen and 4 was assigned to professional workers in technical or education fields (e.g. teachers).

The formula for deriving a socioeconomic composite score was as follows:

$$(a * 10) + (b * 100) + (c * 10)$$

The lowest socioeconomic score was 50, where a household of seven members were without any employment, and the highest educational level was five years. The child's father was in jail, and the observer felt that the children were starving. The highest score was 200, in which a household of five had both parents working, and the mother had ten years of education and worked as an assistant to an occupational therapist.

CATEGORIES OF BEHAVIOUR

In the original investigation, a comprehensive ethogram was constructed for the 80 children studied. A full description of the categories of behaviour coded, and the rationale for their selection being reported in Liddell, Kvalsvig, Strydom, Shabalala & Qotyana (1990). For the purpose of the present analyses, a small selection of ethogram categories was decided a priori. These were primarily categories that other researchers had reported to be of particular significance for cognitive or social status.

A. Patterns of interaction and language use

1. **Levels of social participation**

Social milieu has been found to be one of the most important predictors of developmental status amongst Kenyan children (Sigman *et al.* 1988). In the present study, pilot observations indicated that Parten-based categories of social levels could be reliably distinguished for these children. Many researchers have suggested that these categories are associated with developmental status in the West (Parten 1932; Moore, Evertson & Brophy 1974).

(i) Co-operative: child involved in interaction with others which involves rule-following and/or symbolic role play.

(ii) Associative: child involved in active interaction with others but without any evidence of rule-following or symbolic role play.

(iii) Parallel: child involved in similar activities to other people in immediate vicinity, but without any active talking or prolonged visual monitoring of others.

(iv) Onlooker: child actively monitoring the behaviour of others without any vocal contact or matching of activity to theirs.

(v) Solitary: child is alone.

2. **Interaction partners**

The nature of the social group in which the child was involved, was defined in terms of adults (older than 16 years), or children. There is some debate regarding the degree to which children's interaction with adults is more cognitively challenging than their interaction with other children. However, there is evidence that both child-child (Hinde 1985; Zukow 1989) and adult-child (Harper & Hule 1987) interaction present the child with substantial sociocognitive stimulation, although perhaps of different kinds.

3. **Language use**

Language categories were included on the grounds that language use is thought to be closely linked with cognitive growth and developmental status in Western children (MacDonald & Parke 1984; Ross & Khanna 1989), as well as in other African children (Sigman *et al.* 1988).

(a) Total speech: the amount of time the child spent speaking, or listening to others.

(b) Type of utterance.

(i) Command: an utterance issued with directive intent, i.e. intending to change the behaviour of the speech partner. Commands can be exchanged between children, or given to the focal child (FC) by an adult, or given by FC to an adult.

(ii) Information: an utterance intended to provide information to a speech partner. Information can be exchanged between children, or given to FC by an adult, or given by FC to an adult.

(iii) Other: utterances which are neither commands nor information (no analyses were conducted on this miscellany).

B. Content of activity

Many of the categories that were included under Content have been found to correlate positively with developmental status in Western children, e.g. fantasy play (Connolly *et al.* 1988), chores (Munroe & Munroe 1971), and education (Young-Loveridge 1989). Others have been found to correlate negatively, e.g. unoccupied (Stodolsky 1974) and fight (Pellegrini 1987). The remaining categories were included because they comprised activities that children spent a large proportion of time engaged in (e.g. acrobatic, drawing, engrossed manipulation, and game).

(a) Acrobatic: the focal child is engaged in gross muscle play of a vigorous nature.

(b) Chores: the child is engaged in activities which serve a useful function in terms of household management, e.g. running an errand, washing clothes, making a fire, preparing a meal.

(c) Education: the child is drawing geometric shapes, or letters, or numbers, or is engaged in any form of school-related activity, e.g. reciting the alphabet, playing at school.

(d) Drawing: the child is engaged in illustrations, either in a book or in the sand. Illustrations are not in the form of geometric shapes, letters, or numbers, but in the form of scribbles.

(e) Engrossed manipulation: the child is engrossed with an object where this engrossment is not classifiable as any other form of content category, i.e. not fantasy, or game, or chores, etc. Engrossment is defined as occurring when the child's eyes are focused on the object for the majority of the 30-second interval.

(f) Fantasy: the child is involved in symbolic or make-believe play.

(g) Fight: the child is involved in aggressive behaviour, including explicit threats.

(h) Game: the child is involved in an organized game involving rules and/or turntaking.

(i) Unoccupied: child is not engaged in any notable form of activity.

C. Object use

Object use was included in an attempt to assess the degree to which differences existed in the

resources that children utilized across the four different subgroups. To the extent that different subgroups inhabited different ecological niches, children's access to material objects might have been expected to differ substantially.

(a) Animal: child is involved with animals.

(b) Books: child is involved with books, magazines, newspapers, or other written material.

(c) Household: child is involved with household objects.

(d) Mechanical: child is involved with mechanical objects, e.g. tyres, screwdrivers, cars, etc.

(e) Natural: child is involved with a child-specific toy, either commercial or hand-made.

(g) No object: child's behaviour does not incorporate any object.

Reliabilities: The research assistants undertook interobserver reliability assessments of the ethogram categories as a whole during four periods (approximately four months apart) of the study. A total of 42 hours of data were included in the reliability estimates. The children included in reliability assessments (n = 8) were not part of the final cohort of 80 children. Percentages of agreement were calculated as the number of agreements divided by the number of agreements plus disagreements and expressed in percentage form. Percentages of agreement for the ethogram as a whole are contained in Table 3. Agreement averaged 85,38 %.

Table 3: Interobserver reliabilities: percentage agreements for observers on four assessments during the study

CATEGORY	PERCENTAGE AGREEMENT			
	July '88	Nov. '88	Jan. '89	July '89
Social participation	93,73	85,74	82,69	96,13
Interaction partners	88,87	86,43	73,76	90,94
Language use	86,06	86,13	83,86	92,34
Content	75,73	79,82	73,09	88,90
Object use	81,88	86,39	80,91	94,16

ANALYSES

Ethogram data and ecocultural factors: To be parsimonious, an attempt was made to isolate only one of the four ecocultural variables for insertion into a predictive model. Based on a relatively small n (80 children), and bearing in mind that the model also contained three other independent variables (SES,

household size, and reliance on subsistence) a complex interaction of two or more ecocultural variables was not considered useful.

To assess the relative predictive validity of the four ecocultural variables, four separate regressions analyses were run, using the Statgraphics Statistical Package (Statistical Graphics Corporation 1987). The following independent variables were entered for each category of behaviour: First socioeconomic status - a continuous variable ranging in value from 20 to 200. Second, household size - a continuous variable ranging from 2-19. Third, reliance on subsistence - a continuous variable ranging from one (regular) to three (never). Finally one of the four ecocultural variables. Rural versus urban, Sotho versus Nguni, and Transvaal versus Natal were coded on a 0/1 basis. The marker for four separate places consisted of three columns of dummy variables.

Interaction effects for the four independent variables are not reported here, since preliminary analyses revealed that they contributed very little to the predictive power of models, and merely added to the complexity of reporting results.

The order of insertion for independent variables was determined a priori. As previously discussed, socioeconomic status is the most consistent variable in predicting children's behaviour, household size seemed most important thereafter, with reliance on subsistence being related third in terms of its potential effect. Of the four cultural variables, none seemed as potentially important as the other independent variables. As discussed earlier, the validity of rural versus urban distinctions, for example, has been questioned by other researchers, and similarly with ethnicity. Provincial differences were primarily climatic in nature, and therefore not of theoretically great significance. Although there is some evidence for each community being unique in other studies (Falgate 1962; Weisner *et al.* 1982), a division into four different places was not thought to be as potentially important in a predictive model as would be factors like SES and household size. Consequently, one of the four cultural variables was entered last of all.

Gender of child was not included in the model, based on the results of the original ethogram, in which gender differences were found to be minimal (Liddell *et al.* 1990). Bradley and Caldwell (1984) also report minimal significance for gender effects in their analyses of the effects of crowding, race, and SES for North American children.

To assess predictive validity, r-squared values were examined, with the highest r-squared representing the model that explained most variance. This could be done across the 25 dependent variables that were examined in the study, in order to glean some understanding of the relative effect of the four ecocultural variables, when each were taken in conjunction with the three other independent variables

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of interest. Results of these analyses are contained in Tables 4 and 5.

RESULTS

Of the 25 categories examined, the model containing markers for four different places was significant in 11. The model containing a rural-urban marker was almost as effective, predicting significant amounts of variance in ten of 25 categories. Those containing an ethnicity marker or provincial marker were less successful, giving significant predictions in eight and seven categories respectively. On average the model including four places predicted 11 % of variance, and that containing a rural-urban marker 10 % of the variance.

Table 4: Interaction patterns and language use: r-squared values for models containing SES, household size, reliance on subsistence economy, and either 4 places, rural/urban, ethnicity, or provincial cultural markers.

SES + SIZE + SUBSISTENCE + ...	4 PLACES	RURAL/URBAN	ETHNICITY	PROVINCIAL
INTERACTION PATTERNS				
Solitary	19,36 *	17,16 *	11,88 *	10,68 *
Co-operative	14,07 *	13,56 *	2,92	7,49
Interaction with adults	0,00	0,00	3,91	0,00
Interaction with children	30,91 *	20,24 *	15,17 *	14,10 *
(Mean r-squared)	16,09	12,74	8,47	8,07
LANGUAGE USE				
Total speech	10,78 *	7,78	0,00	0,00
Commands from adults	4,28	3,84	2,87	2,63
Commands to adults	0,00	0,91	6,06	1,15
Commands between children	2,92	3,07	2,58	0,52
Information from adults	2,32	1,63	11,73 *	10,72 *
Information to adults	13,07 *	6,67	0,00	0,96
Information between children	23,88 *	13,96 *	12,80 *	20,23 *
(Mean r-squared)	8,18	5,41	5,15	5,17

* $p < = ,05$

Table 5: .Content categories and object use: r-squared values for models containing SES, household size, reliance on subsistence economy, and one of 4 ecocultural variables

SES + SIZE + SUBSISTENCE + ...	4 PLACES	RURAL/URBAN	ETHNICITY	PROVINCIAL
CONTENT CATEGORIES				
Acrobatic	0,00	0,00	0,84	0,00
Chores	6,92	7,81	0,00	0,00
Draw	8,37	8,39	8,02	7,58
Education	27,29 *	23,30 *	21,42 *	22,83 *
Engrossed manipulation	23,33 *	30,84 *	10,04 *	13,90 *
Fantasy	0,00	0,00	3,90	7,84
Fight	16,63 *	21,49 *	11,97 *	29,50 *
Game	11,80 *	20,43 *	9,75 *	4,77 *
Unoccupied	5,26	13,56 *	4,91	0,84
(Mean r-squared)	12,30	15,33	7,87	9,70
OBJECT USE				
Book	1,24	0,96	0,99	2,87
Household	0,00	0,53	0,08	0,11
Natural	20,84 *	20,90 *	4,72	3,98
Toy	3,05	5,06	1,76	0,16
No object	3,03	2,02	1,75	1,61
(Mean r-squared)	5,63	5,89	2,33	1,75

* $p <= .05$

On the basis of relatively small sample size, and on the fairly comparable performance of models containing four-place as opposed to a rural/urban marker, it was considered advisable at this stage to utilize the rural (n = 40) versus urban (n = 40) marker, as opposed to the four-place markers (n = 20 in each). For this reason, further analyses used the rural-urban dimension for investigation of differences, even though the four places differed more from one another than could be explained solely by a rural/urban distinction.

Considering that the model containing a rural/urban marker also contained three other independent variables, the next question to be addressed is which of these variables explained most variance. Tables 6 to 8 contain the results of MANOVAs conducted from the multiple regressions.

As is evident from the tables, the Rural-Urban marker explains significant proportions of variance in 12 of 25 categories, even though the effects of SES, household size, and reliance on subsistence agriculture have been removed before the effect of a rural-urban marker is examined. In other words it comprises an extremely powerful predictor, over and above the other variables previously examined in the model.

With regard to Social Interaction Patterns and Language Use, rural children spent significantly more time alone, spoke less often, and spent significantly less time in high-level co-operative interaction. When interacting, they were less likely than urban children to be with peers, although equally likely to be with adults. In other words, their lower level of sociability was primarily in terms of the amount of time they spent with other children.

The distribution of commands between target children, other children, and adults, did not differ for rural and urban groups. However, rural children gave information to adults more often than urban children, and exchanged information with peers less often.

With regard to Activities, rural children spent more time in engrossed manipulation of objects, and more time unoccupied. They also spent less time in chores, games, and fighting than did urban children.

In terms of Object Use, this was similar for urban and rural groups, although rural children, not surprisingly, spent more time using natural objects than did urban children. However, overall resource use was the same for the two groups, with household objects most popular, followed by natural objects, toys, and, lastly books.

The degree to which urban and rural children differed in terms of biographical data was examined at this point, to establish whether significant differences in behaviour were reflected in different home circumstances. A Kruskal-Wallis Analysis of Variance was conducted on categorical data, and a simple regression was used for ordinal data. Results are contained in Table 9.

Urban and rural children differed in six of 13 biographical categories. Not surprisingly, urban children were more likely to live in brick dwellings, and rural children in traditional thatched huts or home-made shacks; equally unremarkable was the fact that urban children were more likely to live in homes with indoor taps, and rural children in homes where water was drawn from a standpipe or river. In other words, provision of basic amenities differed in a predictable manner.

Rural and urban children did not differ in terms of the likelihood of books being observed in the household, although urban children were more likely to live in homes containing newspapers/magazines, which were more readily available in urban areas. Urban and rural children's homes were equally provided with toys, almost all of which were home-made.

The households of rural children relied more substantially on subsistence agriculture. However, households were of the same size as for urban children, and there was no significant difference in the number of workers per household.

In terms of educational attainment, the highest level of education evident in a household was likely to be greater in urban areas, although levels of caretaker education did not show an urban-rural difference. Children in urban areas were as likely as those in rural areas to be looked after by their mother, grandmother, or an alternative caregiver, and the average age of the caregiver was the same for rural and urban groups.

In other words, differences in biographical data between rural and urban children are quite limited, except in terms of physical amenities. It seems unlikely therefore, that the rural-urban differences in behaviour are simply the result of radically different patterns of home life, caregiver type, or household organization.

Table 6: Interaction patterns and language use: predictive power of the four selected independent variables across all categories: *F* and (*p*) values

CATEGORY	SES COMPOSITE	HOUSEHOLD SIZE	RELIANCE ON SUBSISTENCE	URBAN VS. RURAL
Solitary	1,43 (0,24)	4,62 (0,04) *	2,15 (0,15)	8,02 (0,01) *
Co-operative	3,22 (0,08)	2,55 (0,12)	0,03 (0,86)	7,46 (0,01) *
Interaction with adults	0,40 (0,54)	0,23 (0,064)	1,08 (0,30)	0,19 (0,067)
Interaction with children	0,21 (0,065)	7,84 (0,01) *	0,90 (0,36)	10,02 (0,00)
Total speech	1,17 (0,28)	1,20 (0,28)	0,01 (0,094)	6,60 (0,01) *
Commands from adults	2,13 (0,15)	1,69 (0,20)	1,95 (0,17)	0,59 (0,45)
Commands to adults	0,93 (0,35)	3,00 (0,09)	0,01 (0,94)	0,61 (0,45)
Commands between children	0,03 (0,86)	0,11 (0,75)	4,22 (0,05) *	1,50 (0,22)
Information from adults	0,19 (0,67)	4,74 (0,03) *	0,00 (0,98)	0,04 (0,84)
Information to adults	0,65 (0,43)	1,92 (0,17)	0,36 (0,56)	5,29 (0,03) *
Information between children	1,26 (0,27)	6,15 (0,02) *	0,35 (0,57)	5,81 (0,02) *

* $p <= ,05$

Table 7: Activity patterns: predictive power of the four selected dependent variables across all categories: *F* and (*p*) values

CATEGORY	SES COMPOSITE	HOUSEHOLD SIZE	RELIANCE ON SUBSISTENCE	URBAN VS. RURAL
Acrobatic	0,91 (0,36)	0,04 (0,84)	0,29 (0,60)	0,69 (0,42)
Chores	1,60 (0,21)	0,02 (0,90)	0,30 (0,59)	7,07 (0,01) *
Drawing	6,21 (0,02) *	0,00 (0,97)	2,68 (0,11)	0,51 (0,49)
Education	9,19 (0,00) *	4,11 (0,05) *	7,28 (0,01) *	1,35 (0,25)
Engrossed manipulation	7,87 (0,01) *	0,06 (0,82)	1,41 (0,24)	20,97 (0,00) *
Fantasy	0,86 (0,37)	1,15 (0,29)	1,61 (0,21)	0,00 (0,97)
Fight	0,01 (0,92)	1,28 (0,26)	0,26 (0,62)	18,60 (0,00)
Game	5,07 (0,03) *	0,08 (0,78)	1,33 (0,25)	12,66 (0,00) *
Unoccupied	1,12 (0,29)	2,99 (0,09)	0,75 (0,40)	8,39 (0,01) *

* $p <= .05$

Table 8: Object use: predictive power of the four selected dependent variables across all categories: *F* and (*p*) values

CATEGORY	SES COMPOSITE	HOUSEHOLD SIZE	RELIANCE ON SUBSISTENCE	URBAN VS. RURAL
Book	0,30 (0,60)	0,48 (0,50)	3,78 (0,06)	0,01 (0,92)
Household	1,08 (0,30)	1,22 (0,28)	1,73 (0,19)	0,28 (0,061)
Natural	2,11 (0,15)	4,10 (0,05) *	1,26 (0,27)	12,12 (0,00) *
Toy	3,53 (0,07)	0,34 (0,57)	0,08 (0,77)	3,20 (0,08)
No object	0,00 (0,96)	2,27 (0,14)	1,13 (0,29)	1,82 (0,18)

* $p <= ,05$

Moving now to the effects of Socioeconomic Status, this predicts significant proportions of variance in only three of 25 categories, even though it is entered into the model first, which maximizes its chances of being significant (Cohen & Cohen 1983). Engrossed manipulation occurred more often in poorer families, and educational activities and games occurred less often. Thus, although the effect of SES was evident in only a small percentage of categories, these categories might be considered particulary salient for children's development.

Household Size was a significant factor in five of 25 categories. Interaction between children was more common in larger households, as was information exchange between children. Information from adults was given less often in larger households. Educational activities were also less frequent in larger households, as was the use of natural objects. The overall impression, therefore, was that larger households may have provided less optimal environments for children, although the effect of this variable was confined to less than 20 % of categories examined.

Reliance on Subsistence Agriculture was of little importance in the model, being significant in only two of 25 categories. Commands were exchanged less often between children in homes that relied heavily on subsistence, a finding for which no reasonable explanation can be offered. Children in households practising more subsistence agriculture also spend less time in educational activities, which meant that all factors in the model excluding the rural-urban dimension, were important in determining the amount of time children spent in school-related activities.

Table 9: Biographical data and rural-urban differences - Kruskal-Wallis Analyses of Variance for categorical data (*KW* and *p* values), and simple regression analyses (*F* and *p* values) for other data

CATEGORY	RURAL/URBAN DIFFERENCE *F* AND *KW* VALUES
HOUSEHOLD CHARACTERISTICS Dwellings (*KW*) *p*	48,07 (0,00) *
Water source (*KW*) *p*	63,31 (0,00) *
Books (*KW*) *p*	6,53 (0,01) *
Newspapers & magazines (*KW*) *p*	15,10 (0,00) *
Toys (*KW*) *p*	5,35 (0,02)
Reliance on subsistence (*KW*) *p*	21,15 (0,00) *
Household size (*F*) *p*	2,87 (0,09)
Number of workers in household (*F*) *p*	4,10 (0,04) *
Highest education in household (*F*) *p*	17,24 (0,00) *
Socioeconomic score (*F*) *p*	20,48 (0,00) *
CHARACTERISTICS OF PRIMARY CARETAKER Relationship (*KW*) *p*	1,92 (0,17)
Caretaker age (*F*) *p*	2,08 (0,15)
Caretaker education (*F*) *p*	6,56 (0,01)

DISCUSSION

The predictive model, based on factors that have previously been found relevant for children's developmental status, and taken in conjunction with a rural-urban marker, explained significant proportions of variance in most areas of Social Interaction and Activity. However, the model proved of little predictive validity for Language or Object Use. Alternative models for the latter two are discussed later.

What is clear from these analyses is that the rural-urban marker - whilst not as salient as a marker for four independent and unique places - is a powerful predictor of the children's Social Interaction and Activities, even after the effect of the three other independent variables had been removed.

The fact that regional differences were of little significance is perhaps understandable, bearing in mind the fact that this difference was primarily related to climate.

However, the fact that ethnicity proved of relatively little significance in explaining differences between children represents a more important finding, and corroborates the work of anthropologists such as Sharp and Thornton. Clearly, ethnicity is of considerably less salience than degree of urbanization, at least in terms of children's everyday lives.

The absence of marked ethnic differences can be explained by the fact that the areas where Nguni and Sotho children were present were cohesive communities, in which Nguni and Sotho families lived together, rather than in isolated locales. The degree to which this may minimize the effect of ethnicity has been commented on by previous researchers (e.g. Weisner 1985). By contrast, the study in which two different ethnic groups of San were found to be markedly different in terms of children's activities and social interaction patterns, focused on a study site in which the two ethnic groups lived in separate compounds, rarely intermingled, and had never intermarried (Liddell 1988). To the extent, therefore that groups of different ethnic origin lived together in cohesive communities, the effects of ethnicity may have been considerably reduced.

Nevertheless, the long-established prevalence of intertribal violence in black South Africa, suggests that, at some stage between early childhood and adulthood, ethnicity becomes a far more salient concept. Even then, though, it is unclear to what extent this becomes reflected in different patterns of everyday behaviour among adults of different ethnic origins.

Turning now to the specific areas of significance obtained by the model, these will be discussed in terms of the four independent variables individually.

URBAN-RURAL DIFFERENCES

Means and S.D.s by rural and urban groups are contained in Table 10.

In terms of Interaction Patterns, rural children were more inclined to be solitary, and less inclined to engage in co-operative interaction. One possible explanation lay in the fact that there may have been fewer interaction partners available in rural settings. However, household size did not differ for rural and urban children, which made this unlikely. During observational data collection, additional information was collected every fifth minute on the number of adults and children within a three metre radius of the focal child, and these were analysed to explore the possibility of differential availability further.

Results indicated no significant rural-urban differences for adults in proximity to focal children (F (79) = 0,00, p = 1,00), with an average of less than one adult in proximity to urban and rural children at any one time. Similarly, an average of one other child was in proximity to the focal child at any one time, and this did not differ significantly between rural and urban groups (F (79) = 1,54, p = 0,22).

Hence, the tendency for rural children to be alone more often, and in co-operative interaction less often than urban children may reflect a real difference in levels of sociability, rather than a mere difference in the availability of interaction partners. In the same context, the fact that rural children interacted more often with adults than did urban children seems to reflect a preference for adult-child interaction in the rural group, rather than a mere difference in adult availability.

Urban-rural differences were found in the exchange of information, with rural children exchanging information with children less often, and receiving information from adults more often than did urban children. Taken in conjunction with the fact that they interacted more often with adults than did urban children, these data suggest that rural children may have closer links with the adult world than their urban counterparts.

The distribution of commands between adults and children did not differ between urban and rural children, which throws into question the assumption that traditional Africa families are more authoritarian than urban families (Klingelhofer 1971).

Table 10: Rural and urban differences in means and (S.D.s) for all categories

CATEGORY	RURAL	URBAN
SOCIAL INTERACTION:		
Solitary	54,61 (24,34)	38,36 (17,42)
Co-operative	6,38 (7,33)	13,98 (10,54)
Interaction with adults	10,00 (7,94)	9,33 (5,70)
Interaction with children	45,46 (35,10)	65,16 (25,18)
LANGUAGE USE:		
Total speech	22,32 (12,65)	30,24 (12,40)
Commands from adults	4,90 (4,85)	5,02 (3,48)
Commands to adults	0,64 (0,99)	1,00 (1,10)
Commands between children	14,55 (5,25)	18,20 (6,84)
Information from adults	6,58 (5,14)	5,41 (3,81)
Information to adults	5,15 (5,09)	3,80 (2,82)
Information between children	34,42 (10,24)	36,99 (8,77)
ACTIVITIES:		
Acrobatic	8,81 (4,07)	9,29 (6,18)
Engrossed manipulation	49,92 (11,05)	31,57 (13,50)
Chores	4,65 (4,36)	7,88 (5,62)
Drawing	1,13 (1,39)	1,60 (2,47)
Education	2,21 (2,73)	3,70 (3,35)
Fantasy	10,49 (9,09)	12,58 (10,55)
Game	2,94 (3,72)	10,19 (7,91)
Fight	0,85 (0,94)	2,17 (1,80)
Unoccupied	0,08 (0,22)	0,53 (0,84)
OBJECT USE:		
Book	2,24 (3,88)	3,46 (5,23)
Household	55,30 (13,35)	29,48 (9,93)
Natural	29,48 (9,93)	19,00 (9,69)
Toy	8,46 (8,07)	13,37 (8,38)
No object	14,43 (8,06)	15,90 (10,58)

Further examination of Table 10 suggests that this is not attributable to both environments being distinctively authoritarian, but instead to their both being relatively well balanced in terms of command: information ratios. Adults certainly issued more commands to children than vice versa and had a higher command: information ratio than was evident in speech between children (which is also reported for Western groups), but they were equally as likely to provide children with information as they were to direct them. Children also passed information to adults almost as often as they received it. Finally, children exchanged four times more commands amongst each other than they received from adults, reflecting the fact that they interacted roughly four times more often with them. Wells (1981) reports that 27 % of five-year old British children's speech was in the form of controlling statements. The comparative figure for the present sample is 17 %, further reflecting the fact that speech was not used primarily for directive purposes.

In other words, there was little evidence of an authoritarian structure of communication in either rural or urban children. These are important data because they represent the first quantitative analyses of actual command and information rates in African children's language exchanges, on the basis of which little evidence can be found for either a general pattern of authoritarianism, or a greater degree of authoritarianism in traditional as opposed to urban settings.

In terms of Activities, rural children spent significantly more time in engrossed manipulation of objects than did urban children, although their overall patterns of Object Use were similar. This finding suggests that rural children were more likely to use objects for their own sake without a transformation of the objects into tools for games, fantasy, or work. Further to this point, rural children were also less likely to be involved in games and chores than were urban children, which may have provided them with less opportunity to transform objects into tools. The predominance of engrossed manipulation in rural children (which occupied them for almost 50 % of the time) may thus reflect a more limited degree of flexibility in resource utilization, a possibility that will be further examined in a subsequent paper (Kvalsvig & Liddell in preparation).

The fact that rural children spent less time in chores than did urban children was surprising, in light of previous reports which have speculated that the reverse might be true (Weisner 1985). In addition, it should be noted that rural children lived in households where water had to be drawn from outdoors, and were more likely to be reliant on subsistence agriculture - two important sources of domestic work for children to assist with.

The finding is important since there as been some hypothetical discussion of the degree to which urbanization results in African children performing fewer chores and thus developing more marginal roles in their families. These data call into question the validity of this assumption, and suggest that urbanization may instead be associated with an increase in chores.

In an attempt to understand this finding, we examined the mean length of time a chore took to complete in urban and rural areas, the possibility being that urban chores were more time-consuming. However, the urban-rural difference was not significant (F (79) = 1,45, p = 0,23).

Household circumstances provided little in the way of data that could explain the difference. For example, urban and rural households were of similar size and had similar ratios of workers to household size. In other words, the demands for assistance around the home were likely to have been similar.

A final explanation was sought in the fact that food production in urban areas took place in the garden, where children would be immediately available to assist. In rural areas, fields were often some distance (as much as 8 kilometres) from the homestead, and preschool-aged children were not frequently taken there to assist. If assistance with chores related to reliance on subsistence was the main source of the urban-rural difference, then one would predict that this difference would be greatest in the households relying regularly on subsistence, i.e. that there would be a significant interaction effect for chores between the urban-rural marker and degree of reliance on subsistence agriculture. A regression analysis in which the two independent variables were entered as main effects before the interaction effect was examined indicated no significant interaction (F (79) = 2,95, p = 0,09).

At this stage, therefore, we are unable to offer any explanation for the fact that urban children are involved in more chores than their rural counterparts, although it is unlikely to be the result of urban chores taking longer, or of urban households having fewer adults available for chores, or of urban children being more likely to be drawn upon in food production.

That rural children were observed fighting less often than urban children may reflect the fact that they observe less aggression and violence than their urban counterparts. The two urban areas (Mamelodi and Umlazi) had been flashpoints for political unrest and rioting over many years, and children living there thought to be more likely to have been exposed to aggression than their rural counterparts. To assess this, the observers were asked to rate children from rural and urban areas in terms of the amount of street violence they had been exposed to. The ratings were done without the observers being aware of the purpose. On a four point scale (never (1), sometimes (2), quite a lot (3), a great deal (4)), children from urban areas averaged a rating of 3, rural children 1.

Ethological research in communities differing in rates of aggression has indicated an association between community violence and children's aggression amongst Zapotec children (Fry 1988), so that less time spent fighting in our rural children may well have been associated with lower levels of community violence.

Rural children spent more time unoccupied than did urban children, although the overall amount of time spent unoccupied was less than 1 % in both groups, suggesting that the difference may have been minimally important in terms of overall differences in activity.

SOCIOECONOMIC STATUS

Contrary to Reynolds' speculations regarding SES and South African children, this had surprisingly little effect on children's behaviour, being of significance in only 3 of the 25 categories. Bearing in mind the considerable salience of SES as a predictor in other studies of children's development and behaviour, this finding merited further consideration. The most obvious reason for the lack of SES differences probably lay in the fact that the entire cohort of 80 children were living in socioeconomically deprived circumstances, when compared with children in the Western world. Whilst there may have been substantial variation in SES score within the group, this did not alter the fact that all children came from poor families. In that the sample was randomly selected, this socioeconomic skewness represents the reality of black South Africa, and calls into question the degree to which SES can be realistically examined using random sampling methods.

The fact that families with lower SES scores had children who engaged in less educational activity, fewer games, and more engrossed manipulation of objects, suggests that, where SES could be isolated as a significant factor, lower scores were associated with less optimal conditions patterns of child behaviour.

HOUSEHOLD SIZE

This affected five of the 25 categories examined, which seemed a relatively small number bearing in mind, first, that households varied widely in size (range 2-19, mean 7,62, S.D. 3,43), and second, that other researchers have reported on the salience of household size for children's behaviour and developmental status. One possible explanation for the absence of size effects lay in the fact that almost all the households would have been overcrowded, bearing in mind that houses and huts were small, and few households contained less than eight members. In the light of the fact that thresholds for crowding are thought to exist, beyond which additional levels of crowding have little further effect, household size may have represented a saturated variable in the present sample.

Interactions between children were more likely to occur as household size increased, as was the exchange of information between children. Information from adults was less likely to occur as household size increased. This suggested that adults might be less available to children, and other children even more so in larger households. Analyses of proximity data indicated that the number of adults in

proximity remained unaffected by household size (F (76) = 1,76, p = 0,43), although there were more children in proximity as household size increased (F (76) = 9,43, p = 0,00). The increased involvement with other children seemed, therefore, to occur because larger households contained more children, although the same did not apply in terms of adults available.

Less time was spent in educational activities by children in larger households, which may be suggestive of an environment less oriented to school-preparedness. Taken in conjunction with the fact that children in large households relied more on other children for interaction and information, these data may be suggestive of larger households providing less optimal environments for preschool-aged children. The degree to which household size is related to scholastic achievement in subsequent years will provide a means of evaluating this hypothesis. A longitudinal follow-up study of the cohort in their second year of school is currently being undertaken to assess the significance of factors such as household size more fully.

RELIANCE ON SUBSISTENCE ECONOMY

This varied greatly, with 31 % of families practising regular subsistence agriculture, 26 % practising some, and 43 % never. Bearing in mind the degree to which this factor has been associated with differences in psychological performance (Berry 1976), it could have been predicted as having an important role in the model. However, it proved a significant factor for children in only two of 25 categories.

Educational activities were less frequent as homes relied more on subsistence agriculture, and (less understandably) commands between children occurred less too.

SUMMARY OF PREDICTIVE VALIDITY OF MODEL

The model, taken as a whole, predicted significant amounts of variance in most of the Social Interaction and Activity categories, and could be regarded as a worthwhile predictive model for these. Nevertheless, it is worth noting that the amounts of variance explained by the model were, at best, considerably lower than those reported from fitting similar models (containing crowding, SES and crowding variables) for North American children (Bradley & Caldwell 1984). In terms of patterns of Language and Object Use the model proved notably unsuccessful in predicting variance.

One may conclude from this that, while Western and non-Western children share certain similarities in terms of the home factors that affect their behaviour and experiences, these similarities are somewhat limited. Factors such as crowding, SES, and ethnicity are less powerful in predicting the African

children's behaviour in the present study. As previously discussed, this is probably attributable at least in part to the fact that SES and crowding were already saturated variables. Nevertheless, in selecting a random sample of these African children, the poor predictive validity of these variables is a true reflection of their predictive status in the black South African context.

Nevertheless, the study corroborates that of Bradley and Caldwell (1984) for North American children, and Weisner *et al.* (1982) for Native Hawaiian children, in finding that within-group variations were often of greater magnitude than between group variations. This finding comprises an important caveat for developmental psychologists as a whole, and cross-cultural workers in particular, providing an important caution against attempting to characterize (or caricature) groups on the basis of dimensions such as ethnicity, urbanization, and household size.

The question arose as to what other variables might explain variance in the "recalcitrants", i.e. dependent variables for which the model was unsuccessful. For recalcitrants, the effects of Caretaker Education, Caretaker Age, Relation of Child to Caretaker, and Time Caretaker had looked after the Child were then examined. These independent variables were looked at individually by simple regression to maximize their chances of exhibiting a significant effect at this preliminary stage.

The best predictor proved to be Relation to Primary Caretaker (mother, grandmother, other), where significant effects were found in four of the 12 recalcitrants (Commands Given to and Received from Adults, Information Received from Adults, and Fantasy). For these four variables, Relation to Primary Caretaker was then inserted into the existing model first, but in only one case (Fantasy) did it result in the overall model predicting a significant amount of variance. In other words, although Relationship to Primary Caretaker seemed significant on its own, its significance did not persist once added to the model that was proving successful for most of the categories examined in this study.

We conclude that the variances in recalcitrants are not easily explained. Either ecological factors not measured in this study were causing variance, or differences within individual children's patterns of activity, object use, and/or social interaction were doing so. The latter will be investigated in more detailed analyses of interaction, activity, and object use (Liddell & Kvalsvig in preparation; Kvalsvig & Liddell in preparation).

The fact that a model containing an urban-rural marker was selected for analysis here, in spite of the fact that a marker denoting four unique places was more successful overall, merits consideration. As previously discussed, the more parsimonious model was selected on the grounds of a small sample size.

Nevertheless, the degree to which the urban-rural grouping masks important and highly significant differences between the four places is noteworthy in itself. It suggests, as Felgate (1982) has done for South African Thonga, that communities vary considerably from one another, though not entirely in terms of more overarching factors such as degree of urbanization, ethnicity, or region.

The finding is an important one. First, because it provides clear evidence of the degree to which the more overarching descriptors may obfuscate the precise roots of difference. As in Weisner *et al.*'s (1982) study of Native Hawaiian children, there was considerable variation between children in the same community, which made broader divisions on the basis of region, ethnicity, or degree of urbanization of questionable validity. Second, because the finding points to the fundamental importance of including more than two samples in any comparison that involves groups that are ranked along the independent variable of interest. This has also been noted by Fischer (1986), but is rarely adhered to in cross-cultural studies, with Berry's (1976) work providing the most notable exception.

To the extent, therefore, that communities comprise unique settings for children, over and above more general conceptual division of ethnicity, urbanization and region, it may be important for cross-cultural psychologists to focus more frequently on community comparisons, as opposed to the broader cross-cultural comparisons. As Preston-Whyte *et al.* (1987) have argued for anthropology, the horizons of our disciplines may have to shrink from a science of universal laws to the more mundane but equally challenging level of understanding local dramas.

REFERENCES AND BIBLIOGRAPHY

ALEXANDER, N. 1989. The language question. Critical Choices for South African Society, 12.

ALTMANN, J. 1974. Observational study of behaviour: sampling methods. Animal Behaviour, 50:227-267.

BERRY, J.W. 1976. Human Ecology and Cognitive Style. New York, NY: Sage.

BLOCH, M.N. 1987. The development of sex differences in young children's activities at home: the effect of the social context. Sex Roles, *16*(5-6):279-301.

BRADLEY, R.H. & CALDWELL, B.M. 1984. 174 children: a study of the relationship between home environment and cognitive development during the first 5 years. In Gottfried, A.W. (ed.) Home Environment and Early Cognitive Development (pp. 5-56). Orlando, FLA: Academic Press.

BRICE-HEATH, S.B. 1986. What no bedtime story means: narrative skills at home and school. In Schieffelin, B.B. & Ochs, E. (eds.) Language Socialization Across Cultures (pp. 97-124). Cambridge, UK: Cambridge University Press.

BRYANT, P. 1985. Parents, children and cognitive development. In Hinde, R.A., Perret-Clermont, A. & Stevenson-Hinde, J. (eds.) Social Relationships and Cognitive Development (pp. 239-251). Oxford: Clarendon Press.

BURDETTE, M.M. 1988. Zambia: Between Two Worlds. Boulder, CO: Westview Press.

COHEN, J. & COHEN, P. 1983. Applied Multiple Regression/Correlation Analysis for the Behavioural Sciences. Hillsdale, NJ: Erlbaum.

CONNOLLY, J.A., DOYLE, A. & REZNICK, E. 1988. Social and pretend play and social interaction in preschoolers. Journal of Applied Developmental Psychology, 9:301-313.

COWLISHAW, G.K. 1986. Aborigines and anthropologists. Australian Aboriginal Studies, 1:2-12.

DUROJAIYE, M.O.A. 1980. The Contribution of African Universities to the Reform of Education, Notably as it Concerns Research on the Development of the African Child. Paris: UNESCO Press.

EDELSTEIN, W. 1981. Cultural constraints on development and the vicissitudes of progress. In Kessel, F.S. & Siegel, A.W. (eds.) The Child and Other Cultural Inventions (pp. 48-88). New York, NY: Praeger.

FELGATE, W.S. 1982. The Tembe Thonga of Natal and Mozambique - an ecological approach. Occasional Publication No. 1. Durban, South Africa: University of Natal Press.

FISCHER, M.M.J. 1986. Ethnicity and the post-modern arts of memory. In Clifford, J. & Marcus, G.E. (eds.) Writing Culture : the poetics and politics of ethnography. Berkeley, CA: University of California Press.

FRY, D. 1988. Intercommunity differences in aggression among Zapotec children. Child Development, 59:1008-1019.

GRAWE, R. 1979. Ability in Preschoolers, Earnings and Home Environment. World Bank, Paper No. 322. Washington, D.C.

HARPER, L.V. & HULE, K.S. 1987. Relations among preschool children's adult and peer contacts and later academic achievement. Child Development, 58:1051-1065.

HINDE, R.A. 1985. Adults and peers in relation to cognitive development. In Hinde, R.A., Perret-Clermont, A. & Stevenson-Hinde, J. (eds.) Social Relationships and Cognitive Development (pp. 111-115). Oxford: Clarendon Press.

KEEFE, K. 1988. Aboriginality: resistance and persistence. Australian Aboriginal Studies, 1:67-81.

KLINGELHOFER, E.L. 1971. What Tanzanian secondary school students plan to teach their children. Journal of Cross-Cultural Psychology, 2(2):189-195.

KVALSVIG, J. & LIDDELL, C. In preparation. Patterns of object use in black South African children: resource utilization and the social milieu.

LIDDELL, C. 1988. The social interaction and activity patterns of children from two San groups living as refugees on a Namibian military base. Journal of Cross-Cultural Psychology, 19(3):341-360.

LIDDELL, C. & KRUGER, P. 1989. Activity and social behaviour in a South African township nursery: a follow-up study on the effects of crowding at home. Merrill-Palmer Quarterly, 35(2):209-226.

LIDDELL, C., KVALSVIG, J., STRYDOM, N., SHABALALA, A. & QOTYANA, P. 1990. An ethological investigation of black South African children in the year before school. Child Development (submitted for review).

LIDDELL, C. & KVALSVIG, J. In preparation. Correlations between social interaction and activity patterns amongst black South African preschool-aged children.

MACDONALD, K. & PARKE, R.D. 1984. Bridging the gap: parent-child play interaction and peer interactive competence. Child Development, 55:1265-1277.

MOORE, N.V., EVERTSON, C.M. & BROPHY, J.E. 1974. Solitary play: some functional reconsiderations. Developmental Psychology, 10:830-834.

MUNROE, R.H. & MUNROE R.L. 1971. Household density and infant care in an East African society. Journal of Social Psychology, 104:135-136.

OSBORN, A.F. & MILBANK, J.E. 1987. The Effects of Early Education. Oxford: Clarendon Press.

PARTEN, M. 1932. Social participation among preschool children. Journal of Abnormal and Social Psychology, 27:243-269.

PELLEGRINI, A.D. 1987. Rough-and-tumble play: developmental and educational significance. Educational Psychologist, *22*(1):23-43.

PRESTON-WHYTE, E. and MILLER, R. 1987. Coping with ethnography: the construction and interpretation of an ethnographic text. African Studies, *46*(1):1-32.

RICHTER, L.M. 1989. Household density, family size, and the growth and development of black children - a cross-sectional study from infancy to middle childhood. South African Journal of Psychology, *19*(4):191-197.

REYNOLDS, P. 1989. Childhood in Crossroads. Cape Town: David Philip.

ROSS, S. & KHANNA, P. 1989. The relationship of high-qaulity day care to middle-class 3-year-olds' language performance. Early Childhood Research Quarterly, 4:97-116.

RUBIN, K.H., MAIONI, T.L. & HORNUNG, M. 1976. Free play behaviours in middle- en lower-class preschoolers: Parten and Piaget revisited. Child Development, 47:414-419.

SCHWENDLER, W. 1984. UNESCO's project on the exchange of knowledge for endogenous development. International Journal of Psychology, 19:3-15.

SHARP, J. 1980. Can we study ethnicity? A critique of fields of study in South African anthropology. Social Dynamics, *6*(1):1-6.

SIGMAN, M., NEUMANN, C., CARTER, E., CATTLES, D.J., D'SOUZA, S. & BWIBO, N. 1988. Home interactions and the development of Embu toddlers in Kenya. Child Development, 59:1251-1261.

SMITH, P.K. & CONNOLLY, K.J. 1980. The Ecology of Preschool Behaviour. Cambridge: Cambridge University Press.

STATISTICAL GRAPHICS CORPORATION. 1987. Statgraphics. USA.

STODOLSKY, S.S. 1974. How children find something to do in preschools. Genetic Psychology Monographs, 90:245-303.

TIZARD, B., BLATCHFORD, P., BURKE, J., FARQUHAR, C. & PLEWIS, I. 1988. Young Children at School in the Inner City. Hove, UK: Lawrence Erlbaum Associates.

WEISNER, T.S., GALLIMORE, R. & JORDAN, C. 1988. Unpackaging cultural effects on classroom learning: native Hawaiian peer assistance and child-generated activity. Anthropology and Education Quarterly, 19:327-353.

WEISNER, T.S., GALLIMORE, R. & THARP, R.G. 1982. Concordance between ethnographer and folk perspectives: observed performance and self-description of sibling caretaker roles. Human Organization, 41(3):237-244.

WELLS, G. 1981. Learning Through Interaction. Cambridge, UK: Cambridge University Press.

WHITING, B.B. & EDWARDS, C.P. 1988. Children of Different Worlds. Cambridge, MA: Harvard University Press.

YOUNG-LOVERIDGE, J.M. 1989. The relationship between children's home experiences and their mathematical skills on entry to school. Early Child Development and Care, 43:43-59.

ZUKOW, P.G. 1989. Siblings as effective socializing agents: evidence from Central Mexico. In Zukow, P.G. (ed.) Sibling Interaction Across Cultures (pp. 79-105). New York: Springer-Verlag.

THE THINKING ACTIVELY IN A SOCIAL CONTEXT

(TASC) PROJECT

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INTRODUCTION

TASC is an approach to, rather than a course or programme for, the development of thinking skills. The authors believe that the RD&D (research, design and dissemination) model for curriculum change has been proven time and again to be ineffective. Persons "in authority" (education administrators, inspectors, principals/rectors), and "experts" (researchers in universities or other outsiders) have a necessary, though not sufficient role. For meaningful change to take place, those directly affected, i.e. the teachers/lecturers and the learners, must also be involved in the planning, implementation and evaluation (Hull & Adams 1981). In some forms this approach has become known as Action Research.

The aim of the TASC project is, therefore, to implement action research and the production of supporting materials such as training videotapes, to meet the needs of those undergoing change; in this case, the introduction of an adjunct approach (removed from the existing syllabus content), together with a metacurricular approach (using syllabus content) for the teaching of thinking skills.

TASC does NOT consist of an "off-the-peg" set of exercises, as is the case with many other thinking skills programmes. To produce these would in fact defeat the main purpose - that of effecting a real change in the ways that teachers and learners perceive their roles in the learning process. The teacher should become a facilitator (i.e. make learning easier) and mediator (i.e. come between the learner and the "world"), and the learner should be purposeful, mindful and active.

Although the basic model on which TASC is based was designed by Adams and Wallace (Adams 1985, 1986; Adams & Wallace 1986; Wallace & Adams 1987, 1988), their essential belief is that classroom teachers and the pupils themselves should play a major role in the development of any course purporting to meet their needs. Consequently, the model was used and is intended to be used as a framework for the guidance of curriculum developers and teachers in designing their own courses in problem-solving in the light of the specific experiences and needs of themselves and their pupils.

RATIONALE AND EMPIRICAL BACKGROUND OF TASC

It is necessary to provide detail of the rationale underlying TASC in order to explain the principles which led to the extension of the project from what was initially intended to be a course in problem-solving for Standard 8 scholars, to the more general framework now proposed. The influences of the various theories will be seen most clearly in the ten TASC Teaching Principles. However, the project name "Thinking Actively in a Social Context" was chosen only after careful consideration of the underlying theories.

The authors acknowledge the fundamental influence of Vygotsky who postulated that intellectual development is not just the acquiring of experience. It is also social transaction which is the fundamental vehicle of education (Bruner 1985:25). He stresses the vital importance of mediation of the child's learning experience. Capable tutors (parents and teachers) initiate the child by structuring activities so that the child gradually gains mastery (Cole 1985). The learner internalizes concepts and thus gains conscious control over his/her actions which he/she then can use as tools for further learning. The tutor performs the function of providing "scaffolding" for the learning task until the learner becomes independent. The new higher concepts transform the meaning of the lower thus making it possible for reflection on past experience in order to interpret the new (Bruner 1985).

Leontev and Luria, Vygotsky's students, are quoted as saying:

> The process of social intercourse and specifically its most systematized form, the teaching process, forms the development of the child, creates new mental formations and develops higher processes of mental life. ... The assimilation of general human experience in the teaching process is the most important specifically human form of mental development in ontogenesis. This deeply significant proposition defines an essentially new approach to the most important theoretical problem of psychology, the challenge of actively developing the mind (Foreman & Cazden 1985:323).

Vygotsky stresses the importance of cultural transmission and intentional mediation of the learner's experience. Where these two processes are inadequate, the learner fails to develop fully effective cognitive functions and this results in the depressed functioning of the individual.

However, although cognitive development can be irreversibly impaired as a result of hereditary or organic factors, recent writers (Feuerstein 1979, 1980; Campione 1982; Brown & Ferrara 1985) show that less than optimal functioning resulting from insufficient mediation of learning experiences can be remediated by appropriate intervention.

The additional theories, which have had a major impact upon the writers, are: Sternberg's (1985) triarchic theory of intelligence; Borkowski's (1985) general model of intelligence; Bandura's (1971; 1977) social learning theory; and Salomon and Perkins' (1989) model of the "high road" and "low road" to transfer of training.

Sternberg proposes that intelligence consists of three interrelated factors:

- The contextual subtheory in which intelligence is viewed as mental activity directed towards the purposeful adaption to, selection of, or shaping of real world environments relevant to one's life. There are clear implications in this for cross-cultural differences in cognition and hence the need for culturally relevant courses in the development of cognition.

- The experiential subtheory which proposes that performance on any task is an indication of intelligence only to the extent that it requires:

    - the ability to deal with novel tasks and/or

    - the ability to automatize the processing of information.

  Courses aimed at the development of thinking and problem-solving behaviours should therefore aim to automatize as many skills as possible. However, since this equates to what Salomon and Perkins (1989) call the "low road" to transfer, care must be taken that this mechanism will only be used for appropriate types of knowledge and skill.

- The componential subtheory in which the mechanism of information processing is specified as follows:

    - Metacomponents are executive processes which are used to plan, monitor and evaluate one's strategy for solving problems.

    - Performance components are used to carry out the instructions of the metacomponents for solving problems.

    - Knowledge acquisition components are used to learn how to solve the problems in the first place.

  All three kinds of components are interactive and need to be trained in tandem.

Borkowski (1985) elaborates a general model of intelligence first proposed by Campione and Brown (1978). The model distinguishes between:

the architectural system in intelligence, that is, the biologically, genetically based properties necessary for processing information, such as memory span, retention of stimulus traces and speed of encoding and decoding information and,

the executive system, that is, the environmentally learned components that guide problem-solving such as long-term knowledge and its retrieval, Piagetian schemes, control processes and metacognition. In common with Sternberg (1986), he stresses the importance of metacognition in the development of pupils' successful learning and discusses three perspectives:

- metacognition as one component of general intelligence interacting with other components throughout life;

- metacognition as the process which promotes the generalization of thinking strategies, and

- metacognition as a possible link between intelligence, self-knowledge and regulation.

Bandura (1971; 1977) in his social learning theory assumes that learning involves a three-way relationship between the environment, personal factors, and behaviour (which includes the learner's cognitive processes). The relationship between each of these three influences is bi-directional. For example, membership of differing social classes may activate differential social treatments, leading to varying influences upon self-concept which in turn influences perception of events and consequent actions. Bandura refers to this as reciprocal determinism.

In Social Learning Theory, there are three components of learning:

- The modelled behaviours, which may be live, verbal or symbolic. The characteristic of a model stimulus (observed behaviour of parents, peers, teachers; recipes or instructions, television, film, etc.), is that it is so organized that the learner can extract and act upon information conveyed, without needing to act overtly.

- The consequences of behaviour, which might be direct reinforcement, vicarious reinforcement or vicarious punishment, or self-reinforcement whereby the learner has self-prescribed standards of behaviour, has reinforcing events under his/her control and is able to act as his/her own reinforcing agent.

- The learners' cognitive processes: This is his/her ability to encode and store transitory experiences in symbolic form and represent future consequences in thought. These cognitive processes include attention, retention, motor production (i.e. some sort of behavioural output), and motivational processes.

The acquisition of complex skills and abilities depend upon two additional components (Bandura 1982). These are perceived self-efficacy, i.e. the learner is convinced that he/she can successfully execute the behaviour required to produce a particular outcome, and self-regulation, i.e. standards for one's own behaviour and the capabilities of self-observation, self-judgement and self-response. These make possible self-direction (goal setting and self-evaluation).

Although transfer of learned knowledge, skills and processes is a key aim of any programme purporting to enhance thinking skills, Salomon and Perkins (1989) point out that "transfer is not at all a unitary phenomenon". Firstly, they problematize the term transfer, in that, at the simplest level, it can mean applying what was learned in yesterday's drill to today's test. They suggest that what distinguishes transfer in the most common usage of the term is the detection of some quantifiable "side-effect" apart from the use of the directly targeted learning content in a context comparable to that in which the learning experiences took place.

Secondly, they suggest that although it is possible to distinguish between the "how" (i.e. the mechanism), and the "what" (i.e. the content) of transfer, the two are inevitably intertwined. One mechanism may be more appropriate for the transfer of explicit knowledge and strategies, another may be appropriate for the transfer of general abilities or clusters of strategies. Salomon and Perkins suggest two distinct mechanisms for transfer; the "low road" of extensive, varied practice leading to the automatic triggering of overlearned behaviour in differing contexts, and the "high road" of intentional, mindful abstraction from one context and the application of this abstraction in differing contexts. They further elaborate "high road" transfer into "forward reaching" (i.e. deliberate speculation as to how newly acquired knowledge or skills might be of use in other contexts), and "backward reaching" (i.e. on facing a new situation, deliberately searching for previously acquired knowledge, skills or strategies which are relevant to the current context).

There is a clear link between both the forward and the backward-reaching aspects of the "high road" mechanism of transfer, and the TASC Teaching Principles take this fully into account. As indicated earlier with regard to Sternberg, there is also a place for the "low road" mechanism of overlearning with respect to specific knowledge and skills.

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THE AIMS OF TASC

The aims of TASC have been revised and extended to focus on pupil development, teacher training and curriculum development as outlined in Figure 1.

The general aim for the learners is to maximize the ability to make sense of and to learn from experience, to take control of their own learning (sometimes referred to as metalearning) and to improve their capacity for decision-making and problem-solving.

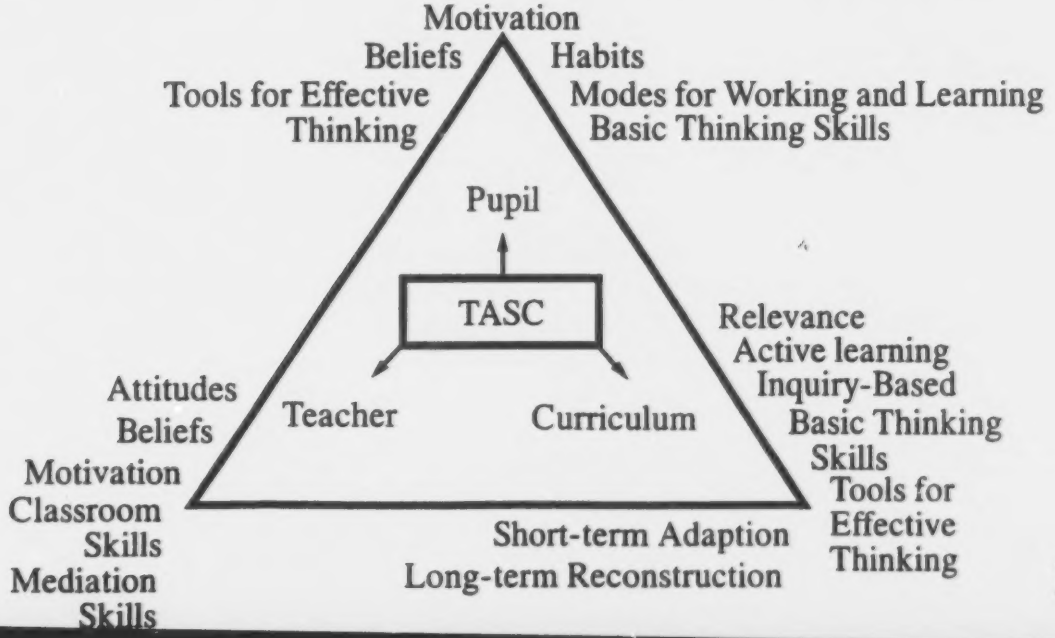
The objectives include the development of

- a wide range of **Basic Thinking Skills**, rules and patterns for thinking (schemes), specific thinking skills,
- a wide range of **Tools for Effective Thinking**, i.e. strategies for combining Basic Thinking Skills,
- a procedure for **Problem-solving** which may be used in a heuristic way or used to construct an algorithm,
- positive attitudes to one's self and one's ability to learn,
- the development of an internal locus of control,
- the habits of perseverance and accuracy,
- co-operative and independent modes of working,
- reflective, non-impulsive patterns of thinking and responding.

The general aim for teachers is to improve the effectiveness of teachers as facilitators of learners' "learning how to learn".

Fig 1

THE OVERALL AIMS OF TASC



The objectives include developing teachers' abilities to adopt the **TASC Teaching Principles** which include

- establishing a democratic and co-operative climate within their classrooms,
- using interactive classroom skills,
- providing "cognitive scaffolding", including modelling and mediation of pupils' experiences,
- extending knowledge of subject content and of principles.

As far as the curriculum is concerned there are short and long-term aims. The short-term general aim is to modify existing syllabuses in order to maximize the achievement of the general aims for teachers and learners. The long-term general aim is to reconstruct the curriculum and rewrite syllabuses in order to achieve the general aims for teachers and learners.

The objectives are

- to make each learner's curriculum relevant to past, present and anticipated needs and experiences;
- to include enquiry-based active learning experiences; and
- to include experiences specifically designed to develop and strengthen Basic Thinking Skills and Tools for Effective Thinking and procedures for Problem-solving.

Our framework coincides to a certain extent with a number of existing thinking skills programmes. Research projects such as those of Frances Link (1981; 1985), Hanson *et al.* (1987) and Blagg *et al.* (1988) have derived a broad framework of cognitive functions which underlie efficient learning, thinking and problem-solving. We have also drawn upon Feuerstein (1980) and de Bono (1976). After many field trials, the overall design of the TASC Working Model is now fully elaborated and is shown in Figure 2. We have drawn up a network of Basic Thinking Skills required for problem-solving.

Figure 3 outlines the categories of Basic Thinking Skills which have been selected as essential resources, but obviously no selection could ever be comprehensive and the teacher may add any additional resources he/she deems appropriate.

Fig 2

TASC WORKING MODEL

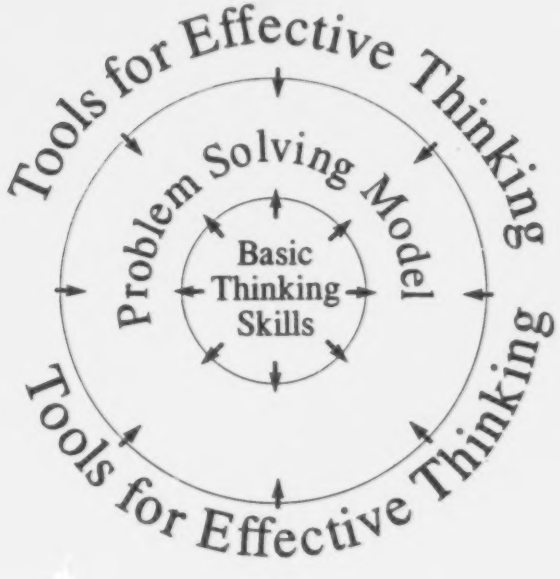
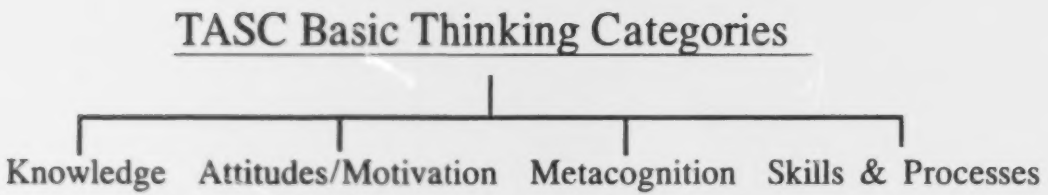


Fig 3


TASC Basic Thinking Categories
Knowledge
Attitudes/Motivation
Metacognition
Skills & Processes

An expanded list of the Basic Thinking Skills is given below. It is from this list that the relevant selections are made for the construction of the adjunct and metacurricular courses. In the training of teachers it is important that they understand the origins and the structure of the list, as well as being aware of its incompleteness. (An outline of the Basic Thinking Skills is given in Figure 3.)

Knowledge includes the acquisition of

- concepts and verbal labels,
- relevant factual information about ideas, objects, events, people.

Attitudinal and Motivational factors include

- being purposeful and optimistic,
- interacting actively with the environment,
- avoiding impulsive responses,
- recognizing the need for systematic exploration, accuracy and precision, making comparisons, summarizing experiences, planning, being flexible in approaching problems, being persistent,
- being willing to work co-operatively or independently as the occasion demands.

Metacognition involves

- being aware of incongruity/incompletion/the existence of a problem,
- selecting cognitive resources,
- selecting appropriate modes of problem representation,
- selecting cognitive strategies,
- allocating attentional resources,
- monitoring progress towards the goal/s,
- being sensitive to external feedback,
- being aware of one's strengths and weaknesses and acting accordingly,
- balancing between critical/analytical and creative thinking,
- planning.

The Skills and Processes can be grouped as the phases of the TASC problem-solving model.

Gathering and Organizing Information involves

- giving attention to detail, and being precise and accurate when necessary,
- considering several sources of information simultaneously,
- giving names to objects, events, ideas, experiences, in order to aid memory and communication,
- developing spatial and temporal concepts and relationships,
- deciding which features of an object remain constant, even when changes occur,
- recognizing, interpreting and being able to follow instructions.

Using Gathered Information to Identify and Solve Problems involves

- relating new data to previous experiences,
- being aware of disequilibrium/incompletion/incongruity,
- distinguishing between relevant and irrelevant information,
- selecting representation, e.g. codes, conventions, symbols, diagrams, pictures, drawings, tables, charts, summaries, keywords, spider diagrams,
- seeking relationships between objects/events/experiences,
- keeping in mind various pieces of information,
- comparing objects/events/experiences,
- finding the class or set to which objects/events/experiences belong,
- understanding and using spatial/temporal references and patterns, including various viewpoints,
- analysing information/problems into parts,
- synthesizing ideas from various sources,
- thinking about different possibilities and consequences,
- using logical evidence to prove things and defend opinions.

Communicating with Co-learners and Communicating the Outcome involves

- avoiding egocentric communication,
- thinking things through before beginning to communicate,
- being clear and precise,
- avoiding blocking,
- selecting an appropriate mode for communication,
- giving instructions clearly,
- using logical evidence to defend opinions,
- being an active listener.

Reflection involves

- comparing new experiences with previous ones,
- classifying objects, events, experiences, problems, solutions,
- considering other circumstances in which the information/experience/outcome/insight might apply,
- deriving rules and principles from experiences,
- hypothesizing and predicting about related problems/issues.

Programmes of instruction concentrate on drawing upon Basic Thinking Skills to form a repertoire of Tools for Effective Thinking which in turn can be called upon in the Problem-solving Process. Figure 4 extends the TASC model to show details of the selected Tools for Effective Thinking and the Phases of the Problem-solving Model. As with the list of Basic Thinking Skills, this is not intended to be exhaustive.

The initial Problem-solving model used with the third year high school pupils has been extended to incorporate a selected range of Tools for Effective Thinking outlined below:

Gathering, analysing and organizing information:

The Tools for Effective Thinking are required for

- systematically exploring and questioning available data using all the senses,
- having the ability to recognize that a problem exists in the first place.

Identifying the real, rather than the imagined or perceived problem:

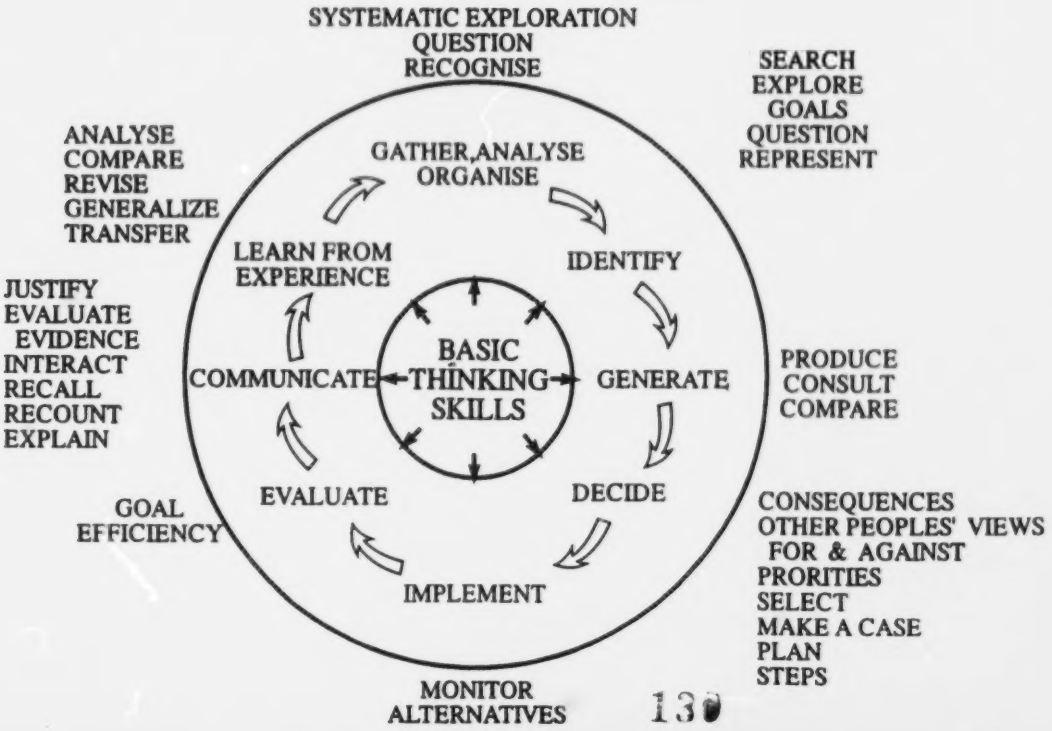
The Tools for Effective Thinking are required for

- searching for and exploring further information, making comparisons with previous experiences, establishing the additional information that is needed,
- analysing the problem into parts, e.g. goals,
- checking the gathered information and representing it in a form that is clear to the learner.

Generating ideas about tentative solutions:

Fig 4

DETAIL OF THE SELECTED TOOLS FOR EFFECTIVE THINKING AND THE PHASES OF THE PROBLEM-SOLVING MODEL



The Tools for Effective Thinking are required for

- possibly producing ideas by brainstorming,
- researching for further information,
- consulting with other people,
- analysing previously used options,
- hypothesizing new alternatives.

Deciding on a possible solution:

The Tools for Effective Thinking are required for

- looking at immediate, mid- and long-term consequences,
- consulting other people about their opinions and wishes,
- establishing priorities in order to select a course of action,
- making a case for the course of action chosen,
- planning a starting point, sequences of working and ways of recording and monitoring.

The Implementation of a course of action does not mean following an inflexible plan:

The Tools for Effective Thinking are required for

- constantly monitoring progress and considering alternatives if necessary,
- establishing the criteria necessary for such checking,
- preparing alternative courses of action,
- continuously checking efficiency against previously made decisions,
- revising procedures if necessary.

Evaluating the extent to which the stated goals have been achieved and whether the process was efficient:

The Tools for Effective Thinking are required for

- assessing not only the solution but the process of arriving at the solution,
- assessing the effectiveness of the use of personal thinking skills and strategies selected,
- examining the quality and efficacy of group interaction and, if necessary, revising the whole problem-solving procedure.

Communicating is a vital stage in the TASC model:

The Tools for Effective Thinking are required for

- exchanging ideas on the solution of the problem and the process of problem-solving,
- justifying decisions taken by evaluating the evidence on which they were based,

- exchanging ideas on the efficiency of their group interaction and organization,
- recalling and explaining succinctly to others.

Reflecting: Although, throughout the problem-solving process, learners are encouraged to reflect on their thinking processes, the TASC model has a definite stage during which Tools for Effective Thinking are required for

- analysing and reflecting on the whole process of problem-solving,
- comparing present performance with previous performances, analysing one's personal strengths and weaknesses,
- revising the whole problem-solving procedure; the strategies used, the Basic Thinking Skills which are utilized,
- seeking to generalize what has been learned and to transfer what has been learned to other situations.

TEACHING PRINCIPLES OF TASC

The following Teaching Principles are an essential part of the TASC approach. Without them the Basic Thinking Skills, Tools for Effective Thinking, and the procedure for Problem-solving, would become merely an alternative content, rather than a new approach.

Adopt a model of the problem-solving process and explicitly teach this. A problem situation is defined as one in which a person or persons have a goal or goals which cannot be achieved because of an obstacle or obstacles. As Jackson (1975) puts it: Problem = Objective + Obstacle. A model of the phases of the problem-solving process have been elaborated as shown in Figure 4. Within a course, learners are given training in the identification and formulation of problems which are relevant to themselves.

Identify a set of specific skills and strategies, and give training in these. As with the training of any skill, one can lay down a sequence of events, namely: demonstrate, analyse and label subskills, practise subskills and improve these by means of external feedback, build the subskills into complex skills and improve these to the point where they will be automatically used. This has implications for the manner in which the subskills and complex skills are dealt with in any thinking skills training course. It does however, beg the issue of which skills are to be trained. Here, TASC has taken a pragmatic approach, whereby in pilot courses, a set of skills relevant to the successive stages of the problem-solving model were selected (goal-setting, prioritization, brainstorming, weighing evidence, considering varying view points, pla..ning...). As the pilot courses progressed, the list of skills became gradually more specific and revealed the need for more basic functions such as comparisons, analogies, and for more complex strategies such as working backwards from a goal, or means-end analysis. It is also important to stress here, that the skills and the contexts in which the skills are embedded need to be culturally

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relevant to the learner. In our case there are major differences in the needs, for example, of urban and rural Black children.

Develop a vocabulary - including verbal labels and visual mnemonics suited to the age and social background of the learners. For example, "evaluate" may be replaced by questions such as "Have we solved the problem?" or "How well did our solution work?" This vocabulary is essential if learners are to engage in reflection on their own performance and discussion of their own thought processes in order to internalize the problem solving process and the thinking skills.

Give ample practice in both the skills and the strategies, using situations which are significant and relevant to the learners. Wherever possible, the learners' own problems should form the basis of their learning; their own experiences should be the starting points for their analysis and the development of more effective cognitive functioning.

Give attention to the motivational aspects of problem-solving. Many disadvantaged learners turn away from tackling problems out of a sense of learned helplessness. They perceive themselves as "incapable", as victims in a world where others are powerful and they are powerless. A positive self-concept must be developed and attempts must be made to move the learner towards an internal locus of control. The learners need to learn how to resolve conflict between the old and the new, the dominant value systems and the less dominant value systems. It is therefore essential to ensure early successes, and to provide constant positive reinforcement: to "empower" learners by giving them experiences by which they can identify themselves as successful problem solvers.

The progression of teaching is from modelling by the teacher, to guided activity by the learner, and eventually autonomous action by the learner. The teacher must be sensitive to the rate of learning and development of confidence of the learner, gradually removing his/her intervention (scaffolding) as the learner gains mastery.

Every effort must be made to enable the learner to transfer skills and strategies to new contexts. This will involve employing any given skill in as wide a range of contexts as possible, and in getting learners to explicitly identify possible new contexts in which these might be used, e.g. in the school curriculum or in wider aspects of life ("forward-reaching" transfer). In new contexts the learner is encouraged to search for previously acquired knowledge or skills which might be relevant in the current context (i.e. "backward-reaching" transfer).

The emphasis is upon co-operative learning in small groups. This enhances the opportunities for participation by each individual. The emphasis is also upon verbal communication which encourages

confidence, develops language and thinking skills.

The teachers should encourage learners' self-monitoring and self-evaluation, and the ability to learn from errors and partial failures as well as successes. Feedback from the teacher is essential and learners should be guided not only in the assessment of the end result of the problem-solving process but also on the problem-solving process itself.

Throughout activities, learners will be required to develop their metacognitive knowledge, i.e. information about their own cognitive as well as their metacognitive skills (executive processes) (Flavell 1985; 1986). Constant introspection and guided reflection by the learner - the verbalization of his/her personal progress and insights - are essential if the learner is to become increasingly aware of his/her thinking processes (Adams & Wallace 1988).

CONCLUSION

This paper briefly explains the theoretical bases of the University of Natal (Pietermaritzburg) Curriculum Development Unit's project "Thinking Actively in a Social Context" (TASC), which is in its second year of externally funded research. It is descriptive rather than evaluative, necessitated by the broad sweep to be covered in limited space. However, there are three academic members of the central team, who have worked directly with scholars/students and with staff at high schools, colleges of education and within the university. All three are carrying out research for higher degrees on aspects of TASC. There are also seven M.Ed. (Curriculum Studies) students, mostly college of education lecturers, working on aspects of TASC for their dissertations. This work will be published to add to that already available (Adams 1985, 1986; Adams & Wallace 1988; Wallace & Adams 1987, 1988) and presentations at conferences in RSA, England, the Netherlands, USA, Taipei, the Philippines, Hong Kong and Australia.

During 1991-2 five "centres" will be established (four colleges of education and one centre for in-service training) each of which will "network" with at least two local high schools. The staff of the centres will use TASC principles and teaching methods in their initial and in-service training, and will support their colleagues in the high schools who will use the Guidance lessons for the four 25-hour non-syllabus adjunct courses and gradually adopt the TASC model in a metacurricular approach in their examinable syllabuses. This is obviously a major undertaking, and will involve all concerned in an equal partnership. The individual schools will proceed at a pace suited to their own unique circumstances, and the centres will become involved with additional high schools as and when they feel able.

Finally, it must be restated that, as far as the curriculum is concerned, the short-term goal of TASC is adaptation of what exists, but the long-term goal is the reconstruction of a new curriculum which is less

content and more process oriented.

REFERENCES AND BIBLIOGRAPHY

ADAMS, H.B. 1985. The Teaching of general problem-solving strategies. In Developing Cognitive Strategies in Young Children. SAALED Conference Proceedings, 24-25 October 1985. University of Durban-Westville.

ADAMS, H.B. 1986. Teaching general problem-solving strategies in the classroom. Gifted Education International, 4(2):84-89.

ADAMS, H.B. & WALLACE, B. 1988. The assessment and development of potential of high school pupils in the Third World context of KwaZulu/Natal (Part III). Developing higher order thinking skills and problem-solving strategies in a co-operative learning environment. Gifted Education International, 5(3).

BANDURA, A. 1971. Social learning theory. Englewood Cliffs, NJ: Prentice-Hall.

BANDURA, A. 1977. Social learning theory. Englewood Cliffs, NJ: Prentice-Hall.

BANDURA, A. 1982. Self-efficacy mechanism in human agency. American Psychologist, 37:122-147.

BANDURA, A. & WALTERS, R.H. 1963. Social learning theory and personality development. New York: Prentice-Hall.

BLAGG, N. *et al.* 1986. Somerset Thinking Skills Course: Awareness Details. Somerset County Council: England.

BORKOWSKI, J.E. 1985. Signs of intelligence: strategy generalization and metacognition. In Yussen, R.S. (ed.) The growth of reflective thought in children (pp. 105-144). New York: Academic.

BORKOWSKI, J.E. & CAVANAUGH, J.C. 1979. Maintenance and generalization of skills and strategies by the retarded. In Ellis, N.R. (ed.) Handbook of Mental Deficiency. (2nd ed.) Hillsdale, NJ: Lawrence Erlbaum.

BROWN, A.J. & FERRARA, R.A. 1985. Diagnosing zones of proximal development. In Wertsch, J. V. Culture, Communication and Cognition: Vygoskian Perspectives. New York: Cambridge University Press.

BRUNER, J. 1985. Vygotsky: A Historical and Conceptual Perspective. In Wertsch, J.V. Culture, Communication and Cognition: Vygotskian Perspectives. New York: Cambridge University Press.

CAMPIONE, J.C. & BROWN, A.L. 1978. Toward a theory of intelligence: Contributions from research with retarded children. Intelligence, 2:279-304.

CAMPIONE, J.C., BROWN, A.L. & FERRARA, R.A. 1982. Mental retardation and intelligence. In Sternberg, R.J. Handbook of Human Intelligence. New York: Cambridge University Press.

CHIPMAN, S.F., SEGAL, J.W. & GLASER, R. (eds.) 1985. Thinking and Learning Skills - Volume 2 Research and Open Questions. Hillsdale, NJ: Lawrence Erlbaum.

COLE, M., GAY, J., GLICK, J. & SHARP, D.W. 1971. The Cultural Context of Learning and Thinking. NY: Basic Books.

COLE, M. 1985. The zone of proximal development: Where culture and cognition create each other. In Wertsch, J.V. Culture, Communication and Cognition: Vygotskian Perspectives. New York: Cambridge University Press.

DE BONO, E. 1976. Teaching thinking. London: Temple Smith.

FEUERSTEIN, R. & SHALOM, H. 1986. The Learning Potential Assessment Device. In Richards, B.W. (ed.) Proceedings of the First Congress of the International Association for the Scientific Study of Mental Deficiency. Surrey, England: Michael Jackson.

FEUERSTEIN, R. *et al.* 1979. The Dynamic Assessment of Retarded Performers: The Learning Potential Assessment Device, Theory, Instruments and Techniques. Baltimore: University Park Press.

FEUERSTEIN, R. *et al.* 1980. Instrumental Enrichment: An Intervention Programme for Cognitive Modifiability. Baltimore, MD: University Park Press.

FLAVELL, J.H. 1979. Metacognition and cognitive monitoring: A new area of cognitive-development enquiry. American Psychologist, 34:906-911.

FLAVELL, J.H. 1985. Cognitive Development. (2nd ed.) Englewood Cliffs, NJ: Prentice-Hall.

FOREMAN, E.A. & CAZDEN, C.B. 1985. Exploring Vygotskian perspectives in education. In Wertsch,

BEST COPY AVAILABLE

J.V. Culture, Communication and Cognition: Vygotskian Perspectives. New York: Cambridge University Press.

FRANKENSTEIN, C. 1979. They Think again: Restoring Cognitive Abilities through Teaching. Van Nostrand Reinhold Co.

FREIRE, P. 1972. Pedagogy of the Oppressed. Harmondsworth, England: Penguin.

HANSON, J. 1987. Oxford Skills Programme. Oxfordshire County Council.

HULL, R.A. & ADAMS, H.B. 1981. Decisions in the science department: Organisation and curriculum. Hatfield, UK: ASE/Schools Council.

JACKSON, K.F. 1975. The Art of Solving Problems. Reading, England: Bulmershe College of Education.

LINK, F.R. 1981. Instrumental enrichment: The classroom perspective. Educational Forum, May: 425-428.

LINK, F.R. 1985. Instrumental enrichment: A strategy for cognitive and academic improvement. In Link, F.R. (ed.) Essays on the Intellect (pp. 89-106). ASCD.

SEGAL, J.W., CHIPMAN, S.F. & GLASER, R. (eds.) 1985. Thinking and Learning Skills: Vol. 1 Relating Instruction to Research. Hillsdale, NJ: Lawrence Erlbaum Associates Inc.

SIEGLER, R.S. & RICHARD, D.D. 1982. The development of intelligence. In Sternberg, R.J. Handbook of Human Intelligence. New York: Cambridge University Press.

SALOMON, G. & PERKINS, D.N. 1989. Rocky roads to transfer: Rethinking mechanisms of a neglected phenomenon. Educational Psychologist, 24(2):113-142.

STERNBERG, R.J. 1983. Criteria for intelligence skills training. Educational Researcher, 12:6-12.

STERNBERG, R.J. 1985. Beyond IQ : A Triarchic Theory of Human Intelligence. NY: Cambridge University Press.

STERNBERG, R.J. 1986. Intelligence Applied: Understanding and Increasing your Intellectual skills. San Diego: Harcourt, Brace, Janovich.

VYGOTSKY, L.S. 1978. Mind in Society. The Development of Higher Psychological Processes. Edited and translated by Cole, M. *et al*. Cambridge Mass: Harvard University Press.

WALLACE, B. & ADAMS, H.B. 1987. Assessment and development of potential of high school pupils in the Third World context of KwaZulu (Part I). Gifted Education International, 5(1):6-10.

WALLACE, B. & ADAMS, H.B. 1988. Assessment and development of potential of high school in the Third World context of KwaZulu/Natal (Part 2) Gifted Education International, 5(2):72-79.

WERTSCH, J.V. 1985. Introduction. In Wertsch, J.V. Culture, Communication and Cognition: Vygotskian Perspectives. New York: Cambridge University Press.

WERTSCH, J.V. 1985. Adult-child interaction as a source of self-regulation in children. In Yussen, S.R. (ed.) The Growth of Reflective Thinking in Children. NY: Academic.

WERTSCH, J.V. & ADDISON STONE, C. 1985. The concept of internalization in Vygotsky's account of the genesis of higher mental functions. In Wertsch J.V. Culture, Communication and Cognition: Vygotskian Perspectives (pp. 162-179). NY: Cambridge University Press.

APPLICATIONS AND ADAPTATIONS OF FEUERSTEIN'S INSTRUMENTAL ENRICHMENT PROGRAMME IN SOUTH AFRICA*

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INTRODUCTION

Sociopolitical conditions in South Africa have been conducive to a widespread deprivation of Mediated Learning Experience (MLE); (Feuerstein 1979). This paper discusses and illustrates the use of Feuerstein's (1980) Instrumental Enrichment (IE) programme as a vehicle for providing MLE and hence alleviating the widespread cognitive deficiencies resulting from such deprivation. Projects are described in which IE is applied and adapted to the respective needs of disadvantaged adolescents in an enrichment programme, and of teachers-in-training. The viability of these applications is suggested, certain criteria of success are reviewed, and the potential value of IE in promoting intercultural integration in South Africa is proposed.

SOCIOPOLITICAL SITUATION IN SOUTH AFRICA

The granite edifice of apartheid that has dominated South Africa for more than forty years is beginning to crumble. The rigid immutability which for so long characterized the system has recently given way to a dynamic volatility. So much so, that by the time this book is published, any overly specific description of the country's political dispensation may be out of date. Nevertheless, what is currently being experienced, and increasingly confronted, are the bitter fruits of a racist regime. There certainly is a need for radical societal change, and for the redistribution of educational and other resources.

The changes that have occurred have generated both hopes and fears. Hopes are that innovative and far-reaching political, social and economic reform will lead to an egalitarian, viable and healthy society. Fears are that conflict, blind adherence to ideology, irrational prejudices, aspirations, expectations and attitudes, and lack of the adequate technological and other skills required to meet the challenges of modern society, will engulf and debilitate the country. The underlying, essential factor that will determine the extent to which the fears or hopes are realized, is the human development that occurs in the intellectual, socioemotional and moral spheres. Given South Africa's history and composition, a salient problem confronting education in South Africa (probably in common with many other countries) is the development of the thinking skills or cognitive potential of people during the rapid transition which our society is undergoing.

Up to now, 86 % of the population (largely blacks but with small percentages of officially classified mixed race or "coloured" and Asian populations) have been denied power and privilege, and are sociopolitically and educationally disadvantaged. They have thus been the victims of institutionally enforced (and informal) racism, and have undergone an undermining of their cultural mores, resulting in a loss of self-esteem. At the same time, apartheid policies, such as influx control laws which led to migrant labour, are recognised to have contributed directly to marital and family break-up among black families (Burman

& Reynolds 1986). With urbanization there has been a breakdown of traditional culture and approaches, and a transition from traditional beliefs, values and customs to a Western orientation, without the substitution of an integrated alternative. The repeal and/or relaxation of influx control and other Draconian apartheid laws has led to the rapid growth of the transitional sector. Thus, an increasing number of people belong neither to the first nor the third world, as they move towards the process of industrialization and urbanization. These rapid changes induced in non-industrial communities when they come into close contact with industrial communities tend to cause disruption and loss of culture and traditional child-rearing practices.

MEDIATED LEARNING EXPERIENCE IN SOUTH AFRICA

The situation cited above suggests that most South Africans have been subjected to oppression, disruption, and transition. In terms of Feuerstein's (1979; 1980) theory, such experiences would not be congenial to the optimal availability of MLE. The anger, and hostility and alienation arising from repression, the indignity resulting from restricted access to the dominant culture, and the confusion emanating from the undermining of their cultural mores, coupled with the disruption caused by migrant labour, and their sociocultural transition, would militate against optimal cultural transmission by most South African parents. For, under the circumstances described, it is understandable that people would lose confidence in themselves and in their culture. Yet, to maintain continuity, viable cultures include their own transmission as an integral part of the culture.

Limitations in the quality of MLE will limit the cognitive development of the children growing up under these conditions. Since, as Feuerstein has conceptualized it, mediated learning is said to determine the capacity for cognitive structures to become increasingly developed. In other words, MLE determines one's ability to benefit from and improve one's responses to direct learning experiences. MLE is prototypically provided by the parent, and later the teacher, who interact with the child and interpret and explain the environment, and both present and historic reality to him/her.

In South Africa, the deprivation of MLE has transformed culturally different populations into those characterized by cultural deprivation. In so far as their culture has not been adequately transmitted to them, they have been denied the basic skills with which to adapt to their own and other environments. For, with transmission of culture, the cognitive skills thereby gained can be translated and developed to adapt to a new societal structure. Because this has generally not occurred in South Africa, the majority of black South African students manifest a phenomenon of secondary retardation; that is, retardation which is the result, not of inherent physiological and/or psychological problems, but of a deprivation in MLE. Translated into cognitive terms, the inadequate development of the prerequisites for thinking and thinking skills has reduced the capacity of children to learn from new experiences, whether in the school, in training, or in life situations.

Furthermore, the South African school system does not afford suitable educational experiences. Indeed, education reflects South African society and the apartheid philosophy more strikingly than any other social institution. For each of the four different racial groups there is a separate and unequal system of education. Some comparative statistics will illustrate this point. Teacher-pupil ratios range from about 16 to 1 in certain white schools, to higher than 62 to 1 in certain rural black schools; per capita expenditure has always been much greater for whites than the other groups; the majority of teachers at black schools are not adequately qualified, whereas the vast majority of teachers within the "white" education system are (Skuy & Partington 1990). It is thus hardly surprising that the common absence of optimal conditions for mediated learning in early childhood is perpetuated throughout the school years. Indeed, the education system has in the past aimed at perpetuating the political status quo, and preserving the subservient role of blacks in the society.

For whites, although far better facilities are available and, although they can be regarded as a materially privileged group, their education system tends to be conceptually antiquated and narrow-minded. Thus, as Donald and Hlongwane (1989) state, the teaching process there (as for other race groups) tends to emphasize child compliance, and requires passive recall of information rather than application of knowledge or analytic and creative problem-solving. The white education system can thus be seen as affording a less-than-optimal basis for mediated learning, and many of the products of such schools tend to merge with limited cognitive modifiability, or impaired thinking skills.

RELEVANCE OF INSTRUMENTAL ENRICHMENT

Central to Feuerstein's theory, and indeed to modern theories of intelligence generally, is the reversibility of the cognitive deficiencies caused by lack of optimal learning experiences, and the amenability of individual learning ability to enhancement. This has led to the current profusion of thinking skills programmes and the widespread interest in their implementation and efficiency.

Of the various thinking skills programmes available, Feuerstein's Instrumental Enrichment (IE) programme has emerged as one of the more widely used, researched and evaluated. The various critical reviews of IE studies (e.g. Adams 1989; Burden 1987, 1990; Savell, Twohig & Rachford 1986) have yielded a positive balance of assets over liabilities, and the programme is seen as potentially valuable. Feuerstein and his associates developed IE as a vehicle for the transmission of appropriate and optimal MLE. He saw its goal as the fostering of autonomous learning ability, in the attainment of which the subgoals of decreasing cognitive deficiencies, enhancing mediated learning experience, and providing optimal opportunities for fostering intrinsic motivation, would be achieved. Reviews of IE consistently suggest that it holds considerable promise for improving the functioning of disadvantaged students (Adams 1989; Savell *et al.* 1986; Sternberg 1984). In fact, Adams (1989:75) stated that "for markedly below average students, IE is uniquely appropriate and effective".

Most of the significant positive results for IE have been in the cognitive area, largely on standard non-verbal measures of intelligence; that is, largely on measures of skill in processing figural or spatial information (Savell *et al.* 1986). On the other hand, while acknowledging transfer effects to school work in some cases, Sternberg and Bhana (1986:63) denied the generality of transfer in part because "the extent of transfer attainable would be so much a function of how well teachers are able to conduct the required bridging". Similarly, Savell *et al.* (1986) state that IE taught in conjunction with some other subject matter of interest and importance to the student (i.e. where IE is integrated into the curriculum) is more likely to be effective in improving general school achievement. However, it appears that it is not enough to leave the bridging to the teacher concerned; one must provide explicit directions and bridging examples between the IE and the subject content.

Although claims have also been made for the relevance of IE in enhancing self-concept, no tested effects on that dimension have been demonstrated. IE has also been seen as more suitable for promoting convergent rather than divergent or creative thinking abilities (Sternberg 1984). Yet it can be argued that both creativity and self-esteem are important to Feuerstein's theory in that the construct of MLE includes *inter alia* mediation of challenge, novelty and risk taking, as well as competence. Moreover, Feuerstein's theory of structural cognitive modifiability involves the development of autonomous thinking and learning, which is related to divergent thinking, and to a good self-concept.

In applying and adapting the Instrumental Enrichment programme to the needs of South Africans, these issues have been explored. Two projects which have done this are described in the sections that follow.

COMBINING IE AND CREATIVITY / SOCIOEMOTIONAL DEVELOPMENT FOR GIFTED ADOLESCENTS IN SOWETO

Passow (1972) asserted that disadvantaged children represent a nation's largest neglected source of talent. The need to identify and foster giftedness among the disadvantaged has been widely documented (e.g. Baldwin 1987; Richert 1987; Torrance 1968). This is particularly true in South Africa, where even children who are identified as gifted, and who are on this basis selected for extramural enrichment, suffer from extensive cognitive deficits (Skuy, Gaydon, Hoffenberg & Fridjhon 1990a). This is associated with the deprivation of MLE brought about by the country's sociopolitical and educational systems. Thus, the Soweto Gifted Child Program (SGCP) was considered to be an appropriate setting for applying and extending the Instrumental Enrichment (IE) programme. Apart from an anecdotal description by Sharron (1987) of an unpublished study by Waksman, Silverman and Messner, there are no documented studies of the effectiveness of the IE programme among gifted students.

In our implementation of IE within the SGCP, explicit attention was given to two dimensions of functioning which are not sufficiently well developed within the IE programme; namely, socioemotional development and creativity, and the explicit bridging of the concepts and thinking skills into scholastic and everyday life.

A two-year experimental programme (1988/1989) was conducted in the SGCP. Students of Standard five and six (N=120) were randomly divided into three groups; one group received a combination of IE and the conventional academic enrichment programme; a second group received a combination of IE and a programme specially designed for this project entitled The Creativity and Socioemotional Development (CASE) programme, and the academic enrichment programme; a third (control) group received only the academic programme. (The schedule of intervention is described in Table 1 below). The experiment was conducted over two years on the 52 Saturday mornings on which the Gifted Programme was held.

Table 1: Programme for each of the experimental conditions

PERIOD	PROGRAMME		
	IE Group	IE/CASE Group	Control Group
1 (9:00 - 11:00)	Work on the Instruments of the IE programme and bridging into academic subjects	Work on the Instruments of the IE programme and bridging	Work on school subjects
2 (11:00 - 13:00)	Work on the Instruments of the IE programme and bridging	Implementation of CASE	Work on school subjects
3 (14:00 - 15:00)	Work on school subjects (English, science, mathematics)	Work on school subjects	Work on school subjects

Over the period of the study, seven of the IE instruments were used, namely, Organisation of Dots, Comparisons, Orientation in Space, Analytic Perception, Categorization, Family Relations, and Illustrations. Work on the actual pages of the IE instruments was interspersed with direct and explicit bridging to the academic subjects, as well as to everyday life situations.

Concurrent with the bridging activities, another aspect of the IE programme implemented was the identification and remediation of cognitive dysfunctions, and the provision to scholars of the tools for metacognition. To achieve this, Feuerstein's (1979) list of criteria of mediation and his list of cognitive functions were adapted and modified. The tutors in the SGCP (who had been provided with formal training in IE) were able to monitor their own mediation by using an MLE rating scale both in lesson preparation and in weekly supervision sessions, which afforded critical evaluation and feedback in relation to their teaching.

The CASE programme complemented and extended the IE programme by applying MLE to the emotional development and creativity enhancement of the students. For example, metacognition - or awareness of one's own thinking processes - was extended to "meta-emotion" or the self-awareness of emotions. Generally, CASE aimed at facilitating self-awareness, awareness of others and the environment, improved interpersonal communications, self-mastery, and a positive self-concept. The creativity aspect of the programme stimulated the assertion of individuality, enrichment of the imagination, and the expression of ideas through various modalities. Unique approaches to problem-solving and conflict situations were incorporated. The approach of the programme was based on the work of Rogers (1961; 1969) and Gordon (1970), and various handbooks were used as resource material. A detailed description of the experimental programme implemented in the SGCP is presented in Skuy, Mentis, Nkwe, Arnott and Hickson (1990b).

In this study the aim was to compare the combined IE/CASE programme with the regular IE programme, both of which would promote explicit bridging of IE principles into the curriculum. Another aim was to compare each of these groups with the control group, which underwent the conventional academic enrichment programme of the SGCP.

RESULTS

Results were obtained on four categories of measures. These included: (1) specially designed tests administered after intervention, to assess the effectiveness with which the respective programmes (IE and CASE) were implemented; (2) analysis of the systematic sampling of videotaped lessons, to assess certain process variables; (3) measures of intellectual functioning, creativity and socioemotional functioning, conducted before and after intervention, to determine differences among the groups as a function of intervention, and (4) a student feedback questionnaire, administered after the intervention to ascertain student attitudes to their respective programmes. Skuy, Mentis, Arnott and Nkwe (In press) provide a detailed description of each set of measures, together with an analysis of the findings. A synopsis of these measures and the results yielded by them is presented below.

Findings for the specially designed measures of the intervention programmes

For the IE and CASE programmes respectively, a measure was devised which reflected the purposes,

principles and activities of the programme. On the IE test, the ANOVA yielded a highly significant difference among the three groups ($F = 15$; $p < 0,001$), which the Bonferroni (Dunn) t-test demonstrated to lie between IE and IE/CASE on the one hand, and the Control on the other. As would be expected, the degree of metacognition and bridging skills demonstrated on this test by the groups receiving IE were significantly superior to the group not exposed to this intervention. For the CASE test, the difference among the groups shown by the ANOVA also reflected significance ($F = 3,08$; $p<0,05$). In this instance the results of the IE/CASE group were shown by the Bonferroni test to be significantly better than the control group. Thus, and again as expected, the IE/CASE group performed more effectively on the measure of interpersonal skills than the other two groups.

Results for the systematic sampling of process variables

In order to measure teacher/student interaction, several scales were used as a basis for analysing videotaped material taken from the classroom. These included Flanders' Interaction Analysis Categories (FIAC) (Flanders 1970), the Orme Scale (Orme 1977) and a Questionnaire on Mediated Learning Activities in the Classroom (Egozi; in Sharron 1987). The ANOVA conducted on the results of the three groups on the MLE scale yielded a highly significant difference among the three experimental conditions, both in the amount of MLE and of non-MLE activity. In both instances, the Bonferroni (Dunn) t-test showed the IE/CASE group's results to be significantly better than those of the IE group, which in turn performed significantly better than the control group. Three items on the FIAC yielded significant differences among the groups, in each case significantly favouring IE/CASE. These items related to acceptance and use of pupils' ideas, and praise and encouragement of pupils. On the Orme Scale, the IE/CASE group produced a significantly better result *inter alia* on two high order questions (namely, those calling for critical awareness on the part of the students, and those requiring students to summarize discussion points). For one of these items (critical awareness) the IE group yielded the same significant result as the IE/CASE programme.

An assessment of the average number of teacher-student interactions of any kind produced during a given session yielded a significant difference among the groups, with the IE/CASE group displaying a significantly greater frequency of interaction than the control group.

Results on the pre-post measures of intellectual functioning, creativity, and socioemotional functioning

These included the following: the combined Similarities subtests of the respective Verbal Scales of the Wechsler Intelligence Scale for Children - Revised (WISC-R) and Wechsler Adult Intelligence Scale - Revised (WAIS-R), which measure verbal reasoning, conceptual ability and abstraction; the Organiser (Feuerstein, Rand, Haywood, Hoffman & Jensen 1983), which assesses hypothetical or inferential thinking, hypothesis testing, application of logical evidence, and summative behaviour. The Similarities and Organiser were chosen as tests of cognitive functioning on the basis of their previously demonstrated reliability and validity with South African adolescents (Skuy & Shmukler 1987; Skuy *et al.* 1990a). In addition, two creativity

measures used were taken from the Torrance Tests of Creative Thinking (Torrance 1974), namely, the Unusual Uses and Circles tests. Both tests were scored on criteria of fluency, flexibility and originality of thought. Two measures of self-concept were also used: the Coopersmith (1967) Self-Esteem Inventory, designed to measure evaluative attitudes towards self in social, academic, family and personal areas of experience; (this study used the School Short Form); secondly, a non-verbal projective technique - that is the Draw-a-Person Test (DAP) - was administered to assess self-concept. The DAP was scored in terms of four criteria drawn from a review of literature on the salient indicators of self-concept (Kamano 1960; Ogden 1978). The four items comprised the size of drawing, fantasy/reality based figure, profile versus frontal view, and placement on the page. To assess social behaviour, a Social Skills Questionnaire (Spence 1985) was used. It involved a rating by the teachers of their students' skills in interacting with adults and peers.

To determine whether there were any significant differences among the IE, IE/CASE, and control groups on any of these individual pre-post measures, separate analyses of covariance (ANCOVAs) were conducted on their respective results. Where significant differences among the groups were found, a Least Squares Mean Test was conducted to determine between which groups the significance lay. Table 2 presents the mean differences on each measure for each of the groups, and indicates on which of the measures significant differences were found.

As Table 2 shows, the Similarities test significantly differentiated both experimental groups from the control group, with a tendency for the IE/CASE to do better than the IE group. There was also a significant difference found for the Unusual Uses verbal creativity test, in this case between the IE and control groups, with the IE/CASE groups tending to be higher than the Control. This was true also for the originality dimension of the Unusual Uses Test. For the flexibility dimension, both the IE and IE/CASE groups performed significantly better than the control group. As Table 2 also indicates, the difference among the groups tended towards significance ($p = 0,07$) on both the Circles (non-verbal) creativity test and the Draw-a-Person self-concept measure.

Table 2: Mean changes and significant differences between the IE, IE/CASE and control groups on the outcome measures

MEASURE	MEAN CHANGE			F	LEAST SQUARES MEAN	
	IE	IE/CASE	Control			
Cognitive						
Similarities	3,4	4,8	2,2	8,80***	IE/CASE > CONTROL	***
					IE > CONTROL	*
Organizer	3,8	2,9	1,8			
Creativity						
Circles						
Total test	9,8	8,7	5,8			
Fluency	2,8	3,1	2,1			
Flexibility	5,0	3,9	2,4	2,86 +	IE > CONTROL	*
Originality	2,0	1,7	1,2			
Unusual Uses						
Total test	13,8	12,1	9,9	3,57*	IE > CONTROL	*
Fluency	5,2	6,7	2,1			
Flexibility	4,9	3,3	2,4	5,78**	IE > CONTROL	*
					IE/CASE > CONTROL	*
Originality	3,7	3,1	1,2	3,36*	IE > CONTROL	*
Socioemotional						
Draw-a-Person	-0,6	0,7	-0,6	2,81 +	IE/CASE > CONTROL	*
Coopersmith	1,6	5,2	1,1			
Social Skills	1,9	3,4	1,7			

df = 2,117 + p = 0,07 *p < 0,05 **p < 0,01 ***p < 0,001

Results on the Student Feedback Questionnaire

Comparison of the mean ratings by students on the Student Feedback Questionnaire indicated that the IE/CASE group tended to rate their programme more positively ($\bar{X}$ = 32,29), followed by the IE group ($\bar{X}$ = 31,07) and then the Control ($\bar{X}$ = 27,28). An ANOVA yielded a significant difference among the groups ($F = 3,15$; $p < 0,05$), while the Bonferroni test indicated that the difference lay between the IE/CASE and control groups. The open-ended section demonstrated that most students of the IE/CASE and IE groups were motivated to report (positively) on their experience, while only about half the control group commented, many of them negatively. The IE/CASE students were particularly forthcoming in their comments, and 85 % of these were unreservedly positive. Several negative comments which did emerge from both the IE and IE/CASE groups related to students' concern that they were receiving less academic input than the control group. They nevertheless favoured their respective groups over the control group.

IMPLICATIONS OF THE RESULTS

Generally, the findings suggest that the explicit inclusion within the IE programme of a component of socioemotional development can improve the effectiveness with which tutors implement IE - both in terms of the quality of MLE and the sustained level of interaction. The results also suggest that, while the IE programme without the explicit focus on interpersonal interaction can have a positive influence on cognitive functioning, the effects may be at least as good, and possibly more pervasive and holistic, when the affective dimension of functioning is also explicitly addressed.

Further, the opportunities for bridging of the IE concepts into the academic curriculum were shown on the IE test to exert a facilitative effect on the students' ability to carry out such bridging. This bridging, or broad application of concepts and expansion of ideas, could also explain the enhanced performance in the flexibility and originality dimensions of creative thinking, as could the encouragement of autonomous thinking within the IE programme. In this regard, the IE group produced better results than the IE/CASE group, emphasizing the opportunities that the IE programme offers *per se* for promoting creativity.

Another noteworthy finding was that, on the combined Similarities subtest of the WISC-R and WAIS-R, the IE and the IE/CASE programmes achieved significantly better results than the control group after intervention. It is interesting that the affective component afforded by the CASE programme exerted a facilitative effect, together with the IE programme, in improving conceptual ability. The positive findings for both IE groups are particularly salutary in that most of the significant positive results in the cognitive area previously reported in studies of IE have been obtained on standard non-verbal measures of intelligence (Savell *et al.* 1986). The positive effects achieved here with the extended IE programme in

the verbal conceptual area are of particular relevance in South Africa - where language and verbal conceptual abilities (in English at least) are major difficulties for disadvantaged communities. The results tie up with those found in a previous study using the Similarities subtests in the SGCP (Skuy *et al.* 1990a). Finally, while no significant differences on measures of socioemotional functioning were found among the groups, there was a consistent tendency for the IE/CASE group to perform better than the IE group, which in turn consistently tended to perform better than the control group.

The viability of the IE programme and of the dimension of socioemotional development for disadvantaged South African adolescents was demonstrated. The acid test, which still lies ahead, requires an evaluation of the long-term effectiveness of the programme, as measured against such objective criteria as school success and social adjustment. A study of this nature is in progress. Meanwhile, spurred on by our initial success in introducing and adapting IE to a South African population, we have proceeded to develop the programme for application to those who might be considered both key targets and agents of change in South Africa, namely, teachers-in-training. This project is reviewed below.

THE TEACHERS' TRAINING COLLEGE PROJECT

TEACHERS AS TARGETS AND AGENTS OF CHANGE

The attitude of teachers to IE has been reviewed by Sharron. Sharron (1987:188) asserts that "one of the most common, almost universal, findings of the international trials of IE has been the enthusiasm of teachers for the new skills of teaching and insights into learning that it can offer". Both Sharron (1987) and Bhana (1987) attribute the increased teacher motivation engendered by IE to the contribution made by the parameters of MLE to the teaching process. Sharron also asserts that IE provides teachers with a theory and a method that give them an understanding of the development and afford them a tool for the analysis of children's thinking. IE can also help the teacher become a conscious agent of societal development. Because of the heightened awareness and insights afforded by IE, the teacher may actually encourage pupils to question to be more proactive, and to make some impact on society.

On the other hand, Ruth Arbitman-Smith of Vanderbilt University in Tennessee (cited in Sharron 1987) asserts that not all teachers are capable of learning how to teach IE. Apparently it is those teachers who see their goals as "making learning a positive experience, who encourage original thinking, who develop positive self-regard, who emphasise co-operation, who have respect for divergent thinking, and who have few disciplinary problems, who tend to be more successful in teaching the IE programme" (Sharron 1987:193). Arbitman-Smith reported, on the other hand, that teachers who found it uncomfortable to work in such an unconventional classroom atmosphere of intellectual collaboration between pupils and teachers, often failed to implement the programme after training.

Of course, teachers who would initially qualify for Arbitman-Smith's latter category may, as a function of training in IE, move closer to the former category of "IE-compatible" teachers identified by her. This raises the question of the effects of IE on the teachers themselves. Two studies that have explored this issue are those by Martin (1984) and Silverman and Waksman (1988). Both studies found that in-service teachers exposed to IE improved their cognitive skills. In the study by Silverman and Waksman, teachers trained in IE asked a higher, more abstract level of question and elicited correspondingly more abstract and less fact-based responses from their students than the control group. The study also found that IE teachers performed significantly better than the Control in deploying strategies to involve students in decision-making. Thus, in that an IE course can serve as a model to teachers for their own implementation, and inasmuch as there is evidence and reason to believe that the IE programme can exert an effect on the thinking and teaching skills of teachers themselves, it would be potentially valuable to introduce IE programmes within teachers' training colleges/programmes. Although this is already done in various countries, there has to date been no documented evidence of the effects of IE on teachers-in-training.

In South Africa, the widespread deprivation of MLE brought about by the oppressive sociopolitical dispensation, and the inadequate and authoritarian education systems, must count among its victims the students brought up under these conditions who eventually become teachers. These teachers would thus be susceptible to perpetuating the deprivation of MLE among the children whom they teach. This vicious circle of deprived teachers and students needs to be broken if apartheid, currently being dismantled, is to be replaced by an enlightened and viable alternative. One strategy is to provide teachers-in-training with compensatory MLE experience using IE (and other thinking skills programmes) as a vehicle. For the judicious design and implementation of thinking skills programmes within teachers' training colleges could serve to render the teacher both the target and the agent for educational, and hence sociopolitical, change. Specifically, IE could provide a framework for enhancing prospective teachers' cognitive and metacognitive skills, and their autonomy as learners and individuals. At the same time, the IE programme would afford the tools (concepts, mediated learning techniques, and motivation), to enhance their teaching. Thus the IE programme can serve the dual purpose of developing teachers' own capacity to think as well as their ability to serve as effective mediators. Teachers can in fact play a crucial role as agents for change, by virtue of the centrality to human development of the school experience, and the multiplier effect engendered by the large number of children with whom teachers come into contact. They are thus afforded the opportunity of imparting the same thinking skills which they have acquired to their students.

Accordingly, a pilot project was launched at the beginning of 1990 in four teachers' training colleges, each of which has been forced under the apartheid laws to cater for a different race group (namely, black, "coloured" or people of mixed race, Asian, and white).

DESIGN AND IMPLEMENTATION OF THE TEACHERS' TRAINING COLLEGE PROJECT

In mounting the project at the various colleges, cognizance was taken of the adaptations and outcomes yielded by the implementation of the IE programme in the SGCP (Skuy *et al*. 1990b; In press). This included the importance of taking cognizance of the socioemotional and interactional dimensions of the IE programme, as well as the effectiveness of the specific bridging of IE concepts into the curriculum and into everyday life situations. Beyond this, in designing the experiment and the IE programme for implementation in each of the colleges, cognizance was taken of their respective administrative constraints, curricula, and the needs of the students and lecturers involved. Thus, the experimental design and the intervention programme for each college was different, and not directly comparable. However, common to all colleges was the existence of at least one comparison/control group in relation to the IE experimental group; in certain cases, IE was compared to and/or combined with another thinking skills programme. For instance, in the college allocated to prospective "coloured" teachers, a four-group design was constituted (N = 80) where one experimental group received an IE-based intervention programme; a second group received a de Bono-based (1975) intervention programme; a third received an intervention programme that combined IE and de Bono; and a control group received the regular methodology classes offered at the college.

To assess the effectiveness of the intervention programmes, the same process and outcome measures were used in all the colleges. Specifically, the measures were intended to (a) identify the particular level and quality of cognitive functioning of the prospective teachers, (b) to investigate the effects of IE (and other programmes) on their thinking, attitudes and cognitive functions, and (c) determine the success of the programmes in enhancing their self-perceptions and abilities as agents of change in the education system.

Areas of measurement for the study included the MEM Test of Abstract Verbal Thinking (Glanz 1989), the combined Similarities subtests of the WISC-R and WAIS-R, Raven's (1958) Standard Progressive Matrices, Rotter's (1966) Locus of Control Scale, the Torrance-Khatena Inventories (Khatena & Torrance 1978), and certain subtests from the Torrance (1974) battery of creativity tests. Other non-standardized measures that were specifically devised for the programme included IE-based projects, a student feedback questionnaire, as well as assessments of lesson plans based on each IE instrument which were designed by students for their particular teaching methodology. In addition, various process measures, including certain of those used in the SGCP study, were included. This involved videotape analysis of student teaching practicals. As the 1990 programme has just ended, data analysis has not yet been completed. This will be presented in a future article.

Follow-up testing is also envisaged once the student teachers are qualified and are actually carrying out the principles they have learnt in the classroom situation. Assessment of both teacher and student performance will be undertaken at that point. Presented below is an illustration of the implementation of IE within one of the college programmes.

ILLUSTRATION OF ASPECTS OF IE IMPLEMENTATION IN THE COLLEGES

Because of the importance of ensuring that the cognitive skills taught within the IE programme are appropriately transferred to academic (and real life) tasks, the skills require explicit bridging into the curriculum (see Adams 1989; Skuy *et al*. 1990b). Thus, within the teachers' training college project, IE was again extended to include specific bridging activities into the students' course content.

College lecturers (teachers) had been trained to use IE in addressing the thinking skills and cognitive functions of the prospective teachers themselves. The lecturers also received supervision in directing the student-teachers' preparation of their lesson plans for implementation with their own future students. Using the IE instrument of Comparisons, illustrations of both bridging into students' course content and into their lesson plans are presented below.

Bridging into course content

Part of the colleges' educational methodology course involved an evaluation of different theories and procedures for planning an effective lesson. The students were presented with the instructional design models of at least five different theorists, and were required to select the most valuable and justify their choice. In performing this exercise it was found that the students had difficulty in moving beyond the level of mere rote recall and comprehension to the higher-order thinking skills of application, analysis and evaluation.

Research has shown that the approach of the "black" education department reinforces rote learning and regurgitation in the pupils. As a result of this, the students appeared to have difficulty in applying the basic skills of comparison (which Feuerstein believes to be the foundation of all decision-making) in order to make an informed choice. Feuerstein's instrument, Comparisons, is designed to address precisely this area of cognitive dysfunction. Yet the effectiveness of merely dealing with the instrument in isolation from the content, with the belief that the skills will automatically transfer to content has been questioned, with respect to this population specifically. Thus the aim in the IE bridging session was to remediate both the cognitive dysfunctions (which have resulted from a disadvantaged educational history) and to maximize transfer of skills to content.

During the IE bridging session, the strategies needed for comparison were mediated to the students using the actual methodology content. The strategy mediated was the creation of criteria for comparison using a comparison table. The elements being compared (the lesson plans) were listed on the horizontal axis, while the criteria for comparison (point of view, unique elements of the plan, etc.) were generated and listed on the vertical axis. The students were able, by the end of the session, to order the plans in terms of usefulness for a student teacher, make a decision about which plan they felt to be the best, and finally to develop their own plan using the list of criteria generated in the discussion. Only after the students had internalized the process or skill of comparison did the actual content become meaningful for them. It was then that they asked for definitions of words, challenged ideas and created their own plans.

This move from a passive-acceptance, rote recall approach to an active involvement with their work content, a search for novelty and a move to independence and competence on the task (which are some of Feuerstein's goals of IE), was achieved through bridging the skills of comparison to the students' actual course content.

The students evaluated the exercise and their comments illustrated that they had moved beyond the level of competence to metacognition (another goal of the IE programme). One student commented that the IE bridging "gives new means of thinking and teaching. The teacher becomes aware of his/her own thinking skills which he/she is using and is diverted from the narrow one-track thinking. This can also be applied to teaching and daily living." Another student perceived this approach as being a break from the conventional form of teaching which emphasized rote recall at the expense of process when she wrote: "This is very important for our educational system, for it will be helpful to do away with this apartheid system. It's about time that our methods and approaches in subject teaching changed".

Bridging into lesson plans

The second major area of extension of the IE programme was bridging of cognitive skills into the school curriculum. This involved both the explicit linking of examples generated in the IE programme itself with subject matter, as well as the creation of original and relevant examples by the students themselves. This was done through the designing of lesson plans linking school content to the cognitive skills central to each particular IE instrument, as well as integrating this with the criteria of MLE.

An example, again using the Comparisons instrument, serves to illustrate bridging into lesson plans - in this example into the subject of Art for an elementary school class. The class activity was to design a three-dimensional sculpture of "a spider about to catch its prey in a cobweb" using several types of metals. The pupils, in preparation for the activity, used the comparison tables three times. Firstly, during their "motivation" phase, they had to compare various insects and spiders according to relevant

criteria such as shape, texture, etc. A second comparison exercise involved examining similarities and differences associated with different metals in order to gain experience in working with the medium and solving problems related to it. Finally, they were required to imagine themselves as being both the spider and the insect and to describe their similar and different emotions, attitudes and experiences of the situation, thus facilitating empathy with the subject matter they were ultimately to sculpt. The concepts generated (e.g. empathy, victim, predator) were then bridged to other human and social situations.

Lesson plans from all the colleges are being compiled into a reference manual for the teachers to use in their future teaching. It should link various aspects of the elementary school curriculum for all colleges which represent all the education departments in South Africa. Given the recent changes in the political sphere, the possibility of a unified education system is very much on the agenda. This makes the need for appropriate and relevant curricula all the more urgent. As this manual will integrate skills with a diversity of content drawn from various cultural and educational sources, it could become a potentially useful tool for future curriculum design, evaluation and implementation in a new South Africa.

Two other dimensions of Feuerstein's theory were integrated into this bridging programme. The first was Feuerstein's list of criteria for Mediated Learning Experience (MLE), whereby college teachers and students monitored their effectiveness as mediators. The MLE criteria were presented to students as a model for effective teaching and both teachers and students rated their use of MLE when recording both their lecture sessions as well as designing lesson plans. A special lesson record sheet was designed for this purpose. A MLE workbook, presently being designed to provide explanations, examples and exercises, will give students practice in applying mediation.

The second dimension was the use of Feuerstein's list of cognitive dysfunctions whereby students gained insight into their own cognitive skills and thus moved to a level of reflective thinking and metacognition. Feuerstein's checklist for cognitive functions and dysfunctions was introduced to the students within the bridging sessions to help them monitor their own cognitive skills. His terminology in listing the cognitive dysfunctions was found to be linguistically problematic, particularly where English is a second language. Thus a second workbook is currently being designed to provide explanations, examples and exercises whereby the students may become more familiar with the terminology.

EXTENSION OF THE TEACHER-TRAINING PROJECT

Central among our plans for the extension of the project described above, is the investigation of IE as an effective vehicle for achieving an optimal level of cultural integration in South Africa. For the recognition has finally dawned that South Africa is to become one integrated nation, and apartheid structures and laws are gradually disappearing. With regard to education, we have seen the thin end of the wedge, as universities have become desegregated, and as state schools are being given the option of a limited open enrolment policy. At the same time, a unitary, integrated education system has not yet been attained, and teachers' training colleges (which are mainly responsible for the training of elementary school teachers) are, at the time of writing, still segregated by race. Both these mainstays of apartheid are destined to be abandoned in the near future.

South Africa has a long history of dividing people into subgroups in terms of colour, race and culture, and of enforcing and prizing such separateness. Moreover, it has been a society in which racial (and other forms of) prejudice have been rampant. While the recent reversal of government philosophy and policy has been essential for the beginnings of a transformation of the society into a normal, integrated one, such sociopolitical changes are not sufficient. If South Africa is to become a truly integrated and harmonious society, there is a need to improve communication on both the affective and cognitive levels. Moreover, there is a need to synthesize the diverse cultures which comprise South Africa into a uniquely South African nation.

Based both on theoretical considerations, as well as on personal experience of cross-cultural IE training courses, it appears that the IE programme could play a role in achieving this goal. Thus, the stage is set for the explicit application of IE concepts and activities to the promotion of intercultural understanding and integration among prospective teachers. The approach to implementing the envisaged programme, and the effectiveness of this adaptation of IE, will be rigorously studied and systematically documented.

REFERENCES

ADAMS, M.J. 1989. Thinking skills curricula: their promise and progress. Educational Psychologist, 24:35-37.

BALDWIN, A.Y. 1987. I'm black, but look at me, I am also gifted. Gifted Child Quarterly, 31:182-185.

BHANA, K. 1987. Thinking Skills Programmes: a solution to all problems? Conference Proceedings of the National Conference of the South African Association for Learning and Educational Disabilities (pp.169-198). University of the Witwatersrand, Johannesburg.

BURDEN, R.L. 1990. Whither research on Instrumental Enrichment? Some suggestions for future action. International Journal of Cognitive Education and Mediated Learning, 1(1):83-86.

BURMAN, S. & REYNOLDS, P. 1986. Growing up in a divided society. Johannesburg: Ravan Press.

COOPERSMITH, S. 1967. The antecedents of self-esteem. San Francisco: W.H. Freeman.

DE BONO, E. 1975. CoRT thinking materials. London: Direct Educational Services.

DONALD, D.R. & HLONGWANE, N.E.M. 1989. Consultative psychological service delivery in the context of black education in South Africa. International Journal of Special Education, 4:119-140.

FEUERSTEIN, R. 1979. The dynamic assessment of retarded performers. Baltimore: University Park Press.

FEUERSTEIN, R. 1980. Instrumental Enrichment. Glenview, IL: Scott, Foresman.

FEUERSTEIN, R., RAND, Y., HAYWOOD, C., HOFFMAN, M.B. & JENSEN, M.R. 1983. Learning Potential Assessment Device. Unpublished manual, Hadassah-Wizo Institute, Jerusalem.

FLANDERS, N.A. 1970. Analyzing teaching behavior. New York: Addison-Wesley Publishing Co.

GLANZ, I. 1989. Thinking as a three-directional function. Tel Aviv, Israel: Gomeh Scientific Publications.

GORDON, T. 1974. Teacher effectiveness training. New York: Peter H. Wyden.

KAMANO, D.K. 1960. An investigation on the meaning of human figure drawing. Journal of Clinical Psychology, 16:429-430.

KHATENA, J. & TORRANCE, P. 1978. Khatena-Torrance creative perception inventory: Instruction Manual. Chicago: Stoelting Co.

MARTIN, D.S. January 1984. Can teachers become better thinkers? Paper presented at the Annual Meeting of the Association of Teacher Educators, New Orleans.

OGDEN, D. 1978. Psychodiagnostics and personality assessment: A handbook. (2nd ed.) California: Western Psychological Services.

ORME, M. 1977. Teaching strategies and consultation skills: Probing techniques. In Miezitis & Orme (eds.) Innovation in school psychology. Toronto: The Ontario Institute for studies in education.

PASSOW, A.H. 1972. The gifted and the disadvantaged. The National Elementary Principal, 51:24-31.

RAVEN, J.C. 1958. Standard Progressive Matrices: Sets A-E. London: H.K. Lewis.

RICHERT, E.S. 1987. Rampant problems and promising practices in the identification of disadvantaged gifted students. Gifted Child Quarterly, 31:149-154.

ROGERS, C.R. 1961. On becoming a person. Boston: Houghton Mifflin.

ROGERS, C.R. 1969. Freedom to learn. Columbus, OH: Merrill.

ROTTER, J.B. 1966. Generalised expectancies for internal versus external control of reinforcement. Psychological Monographs, *80*(1).

SAVELL, J.M., TWOHIG, P.T. & RACHFORD, D.L. 1986. Empirical status of Feuerstein's Instrumental Enrichment techniques as a method of teaching thinking skills. Review of Educational Research, 56:381-409.

SHARRON, H. 1987. Changing children's minds: Feuerstein's revolution in the teaching of intelligence. London: Souvenir Press.

SILVERMAN, H. & WAKSMAN, M. 1988. Feuerstein's Instrumental Enrichment: elicitation of cognitive interaction in the classroom. Canadian Journal of Special Education, 4:133-150.

SKUY, M., GAYDON, V., HOFFENBERG, S. & FRIDJOHN, P. 1990a. Predictors of performance of disadvantaged adolescents in a gifted programme. Gifted Child Quarterly, *34*(3):97-101.

SKUY, M., MENTIS, M., NKWE, P., ARNOTT, A. & HICKSON, J. 1990b. Combining Instrumental Enrichment and creativity/socioemotional development for disadvantaged gifted adolescents in Soweto: Part 1. International Journal of Cognitive Education and Mediated Learning, 1(1):25-31.

SKUY, M., MENTIS, M., ARNOTT, A. & NKWE, P. In press. Combining Instrumental Enrichment and creativity/socioemotional development for disadvantaged gifted adolescents in Soweto: Part 2. International Journal of Cognitive Education and Mediated Learning.

SKUY, M. & PARTINGTON, H. 1990. Special education in South Africa. International Journal of Disability, Development and Education, 37(2):149-157.

SKUY, M. & SHMUKLER, D. 1987. Effectiveness of the Learning Potential Assessment Device with Indian and "Coloured" adolescents in South Africa. International Journal of Special Education, 2:131-149.

SPENCE, S. 1985. Social skills training with children and adolescents. Berkshire, England: NFER-Nelson Publishing Co.

STERNBERG, R.J. 1984. How can we teach intelligence? Education Leadership, 42:38-49.

STERNBERG, R.J. & BHANA, K. 1986. Synthesis of research on the effectiveness of intellectual skills programmes. Educational Leadership, 44:60-67.

TORRANCE, P. 1968. Finding hidden talents among disadvantaged children. Gifted Child Quarterly, 12:131-157.

TORRANCE, P. 1974. Torrance tests of creative thinking: technical-norms manual. Lexington, MA: Personnel Press.

THE SKILLS PROGRAMME :

AN ATTEMPT TO BRIDGE THE PROBLEMS OF EDUCATION IN SOUTH AFRICA

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INTRODUCTION : THE SKILLS PROGRAMME

Ever since its inception at the end of 1986, the Centre for Cognitive Development has been committed to addressing some of the educational deficiencies of this country. Initially this was done by focusing on the lack of cognitive development in the classroom. Orientation and training programmes were run where mediative teaching styles were presented and teachers were made aware of the importance of cognitive skills in the various subjects. The importance of understanding and application of knowledge rather than rote-memorization of facts were emphasized. From this original concept, a programme was developed, called the SKILLS programme, an acronym for

Strategic
Knowledge,
Innovative
Learning, and
Life
Skills

This programme emphasizes

1. relevance of knowledge,
2. insight into and innovative application of what has been learnt,
3. understanding of subject content, especially in Mathematics and Science,
4. creative thinking,
5. problem-solving and decision-making skills,
6. life skills,
7. the importance of the child's self-esteem in the learning situation,
8. the learner being actively involved and taking dual responsibility for the learning process.

TEACHER INVOLVEMENT

During the past four years, approximately 3 800 teachers and lecturers have been exposed to these orientation programmes. Among these have been preschool teachers from Daveyton, Katlehong and Soweto; primary school teachers from Atteridgeville, Reiger Park, Eersterust, Eldorado Park, Rand Mines' and Mobil Oil adopted schools throughout South Africa; secondary school teachers in Bophuthatswana, Umlazi, Ezikhaweni and Middelburg, and university and college lecturers from institutions such as Goudstad Onderwyskollege.

The above-mentioned interaction with these teachers and lecturers highlighted the fact that the problems of education in Southern Africa have been exacerbated by segregationist educational and political policies. For example, a questionnaire on teacher-child relationships which was completed by more than 800 black, white and coloured teachers and lecturers revealed the emphasis on obedience and respect for authority. In reply to the statement "Obedience and respect for authority are the most important virtues children should learn", 93 % of the people who completed the questionnaire strongly agreed. This questionnaire also showed that the classroom situation is teacher-centred and the children are merely passive receivers of information.

During these orientation programmes, which were workshopped with teachers, a number of issues came to the fore. For example, lack of motivation, negative attitudes towards pupils, lack of training in coping with large numbers of pupils, lack of confidence, fear of losing control, etc.

RESEARCH

At the same time, several empirical evaluations of the programmes and projects of the Centre for Cognitive Development have been done both by independent researchers and by the Centre's own psychologists. Three major research projects were undertaken with primary school teachers, as well as three children's projects. The empirical research of these projects, which will be discussed shortly, confirmed the qualitative findings which emerged from the orientation programmes, namely, the adverse effects of a conservative, authoritarian and segregationist educational policy on the attitudes and confidence of the majority of teachers.

ATTERIDGEVILLE PROJECT

The most extensive research project completed to date is an assessment of the attitudes and approaches to problem-solving of a group of 50 Atteridgeville teachers by Unisa's Institute for Behavioural Sciences. These teachers revealed a high level of rigidity and authoritarianism, and were found to be inflexible, intolerant and prejudiced according to information revealed in their responses to the relevant scales. The researchers commented that it was apparent to them that the teachers' attitudes on morality and group interest matters would need attention in any attempt to change their orientation towards their work and their relationships with their pupils (Griesl & Richter 1987).

This interpretation was endorsed by findings that the teachers expressed more negative than positive teaching attitudes. They showed a desire to dominate the classroom, and revealed perceptions of pupils as having malevolent intentions towards them.

With regard to the teachers' cognitive abilities, which were assessed in puzzle-solving and creativity situations, the absence of available normative data made interpretation of the results difficult.

Performance on the pictorial creativity tasks was much better than on tasks requiring verbal abilities. In general, the verbal subtest was so poorly performed that it had to be excluded from posttesting. Thus the lack of verbal fluency would probably impact on their teaching to a large extent.

Results of Atteridgeville Project

Following attendance at the Centre's courses and follow up sessions, posttesting revealed that teachers were slightly less conservative, authoritarian and rigid. They also showed greater empathy with pupils and democratic classroom management. The latter was statistically significant. In absolute terms, however, the group remained relatively inflexible, authoritarian and with less empathy toward pupils by comparison with Western norms. Evaluation of their cognitive (problem-solving) performance suggested that they used less acceptable strategies on the second evaluation than at the first. The researchers attributed this to the fact that the teachers were more self-conscious on this occasion and that they were working under the restriction of trying too hard (Griesl 1990).

REIGER PARK PROJECT

The second major evaluation of the work of the Centre is a three-year ongoing project which will evaluate 60 primary school teachers from Reiger Park and the effect of a cognitive skills programme on 40 Std 5 pupils (seven years of schooling). Two of the aspects researched in Atteridgeville, namely teachers' attitudes to teaching and children, and teachers' problem-solving skills, were also researched in this project. However, an attempt was made to assess an important component of the Centre's work, namely teaching styles.

The Reiger Park groups of teachers, like the Atteridgeville group, demonstrated generally negative attitudes towards school, children and teaching in general. They also performed poorly on three tasks requiring problem-solving skills in a controlled situation.

The evaluation of the teaching styles involved the assessment of approximately 40 videotaped lessons. These were rated on a series of three-point scales developed by the Centre in conjunction with Unisa's Institute for Behavioural Sciences until acceptable objective ratings could be achieved. Ratings were given for the degree of presence/absence of the following criteria: Classroom Rapport (non-threatening atmosphere, positive reinforcement, interactive teaching style); Cognitive Teaching Techniques (presence or absence of metacognition, bridging, concept formation); Questioning Techniques (open questions, pupil participation, waiting time), and Teaching Specific Cognitive Skills (intentional, spontaneous). The pretest scores were low, particularly in teaching of specific cognitive skills.

Results of Reiger Park Project

After the completion of the first year of the programme, the teachers showed more positive attitudes toward teaching and children at posttesting. However, this was not statistically significant. The posttest scores of the teachers on the problem-solving tasks showed a substantial improvement which was statistically significant.

The posttesting of teaching styles demonstrated a significant increase in three out of the four rating categories, with the greatest improvement being in the employment of new teaching strategies, and the least improvement in the area of teaching specific cognitive skills.

CHILDREN'S PROJECT

An evaluation of the Reiger Park pupils' project is currently underway, but initial posttesting has shown that relative to a control group (from another area) which showed no change, the average scores on measures of self-esteem and locus of control of the experimental pupils had improved significantly within a year. The cognitive development of the pupils will be evaluated at the end of the third year of the project.

NEW SKILLS MODEL

Although we were very pleased with the effect that the programme had had over a short period of time, we used these findings as well as the feedback from teachers during orientation courses to improve our SKILLS programme. Greater emphasis is now being placed on attitudinal change in teachers to a more democratic and open style of teaching and classroom management.

The first unit of the new training model effects personal empowerment in teachers, as teachers are taken through a process of self-understanding and knowledge in relation to important aspects of their lives. The overall purpose is to develop the kind of insight and skills which will enhance teachers' confidence and personal effectiveness within the context of their schools and communities.

The second unit is that of Teacher Empowerment. This part of the new model is an extension of the original SKILLS programme and focuses on three areas, namely classroom management, teaching styles and cognitive intervention.

Under Classroom Management, the following aspects are dealt with, namely pair problem-solving, group work, projects, field trips, assignments, the use of drama, etc. Strong emphasis is placed on the importance of a relaxed, caring classroom atmosphere.

The area covering teaching styles includes such aspects as mediative teaching styles, positive belief system, the enhancement of pupils' self-esteem, the importance of positive feedback, open and closed questioning, metacognition, cross-curricular work, etc. This is done at three levels and includes lesson preparation, subject workshops and role playing.

The third area covered is cognitive intervention, and concentrates on the inclusion of specific cognitive skills into subject teaching, concept development, the use of preknowledge and association, study skills, lateral thinking and decision-making.

These two units, namely Personal Empowerment and Teacher Empowerment, run simultaneously over 18 months and entail 30 days of workshopping plus follow-up and facilitation as requested by the specific group of teachers. One of the main reasons for extending the timespan of the programme is to ensure that the knowledge and skills gained by the teacher will be transferred to the classroom situation and lesson presentation.

As the Centre believes in a consultative process and empowerment of the people at ground level, a third unit has been included in the new training model in which trainers and facilitators identified in the various communities are trained. Not only will this enable the community to take over the control and continuation of the project after three or four years, but it will ensure that an educational philosophy which is acceptable to all people in this country will develop and become part of the new education system.

The Trainer Empowerment consists of two sections, a Critical Thinking section and the Training of Trainers and Facilitators in the application of the Personal Empowerment and Teacher Empowerment units. This third unit spans a six month period and includes twenty days training and workshopping.

CONCLUSION

In conclusion, on a more affective or emotional level, it should be added that, at the end of every course presented by the Centre for Cognitive Development since January 1987, anonymous questionnaires pertaining to the relevance of the course, have been completed by course attendants. The feedback thus gathered has almost always been extremely positive and teachers have expressed excitement and an increased level of motivation for their profession. This positive feedback was sustained during follow-

up visits when members of the Centre visited schools to evaluate individual teacher performance in the classroom. Ratings by the follow-up evaluators, admittedly subjective, were positive and we were often amazed at how well some of the teachers had incorporated the skills taught during the orientation course. We were also very pleasantly surprised at the changes in attitudes that had occurred, and this was confirmed by feedback from school inspectors and principals.

Now that the political mould is being broken and the whole of the Southern African society is faced with the challenge of rapid change, it is critically important that change on the educational front is as dramatic and rapid as the social and political changes taking place. It is our sincere belief that the SKILLS model which has been developed by the Centre for Cognitive Development over the past four years is a positive step in this direction as it equips teachers with democratic teaching methodologies, and builds the confidence that will enable any teacher to teach in the new non-racial education system of South Africa.

REFERENCES

GRIESL, R.D. 1990. Project evaluation of pupils undergoing a cognitive development programme in Reiger Park. Unpublished report of the Institute for Behavioural Sciences, UNISA, Pretoria.

GRIESL, R.D. & RICHTER, L.M. 1987. Baseline evaluation of a teacher training programme in Atteridgeville conducted by the Unit for Cognitive Development of Vista University. Unpublished report of the Institute for Behavioural Sciences, UNISA, Pretoria.

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